SHOUT
SHARE
IT

506.713
C23

THE

CANADIAN JOURNAL

OF

INDUSTRY, SCIENCE, AND ART:

CONDUCTED YB

THE EDITING COMMITMEE OF THE CANADIAN INSTITUTE.

NEW SERIES.

VOL. X.

Smithsonian Institution
344619
U.S. National Museum

TORONTO:
PRINTED FOR THE CANADIAN INSTITUTE,
BY LOVELL & GIBSON, YONGE STREET.
MDCCCLXV.

CANADIAN INSTITUTE.

EDITING COMMITTEE.

GENERAL EDITOR - - Rev. WM. HINCKS, F.L.S.

I. *Geology and Mineralogy:* E. J. Chapman, Ph.D., Prof. of Geology and Mineralogy, Univ. Coll. Toronto.

II. *Physiology and Natural History:* Rev. Wm. Hincks, F.L.S., Prof. of Natural History, Univ. Coll., Toronto.

III. *Ethnology and Archæology:* Daniel Wilson, LL. D., Prof. of History and English Literature, Univ. Coll., Toronto.

IV. *Meteorology:* G. T. Kingston, M.A., Director of the Magnetic Observatory, Toronto.

V. *Chemistry:* Henry Croft, D. C. L., Prof. of Chemistry and Experimental Philosophy, Univ. Coll., Toronto.

VI. *Mathematics and Natural Philosophy:* J. B. Cherriman, M. A., Prof. of Natural Philosophy, Univ. Coll., Toronto; and the Rev. G. C. Irving, M.A., Prof. of Mathematics, Trin. Coll., Toronto.

VII. *Engineering and Architecture:* Sandford Fleming, C. E.

VIII. *Philology:* Rev. E. Hatch, B.A., Prof. of Classics, Morin Coll., Quebec.

23

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE

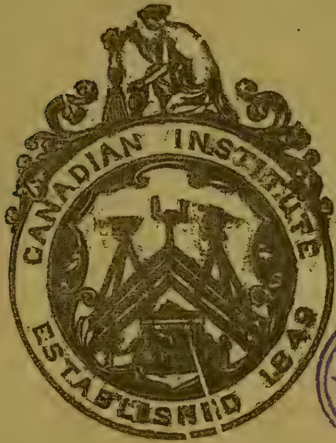
CANADIAN JOURNAL

OF

INDUSTRY, SCIENCE, AND ART:

CONDUCTED BY

THE EDITING COMMITTEE OF THE CANADIAN INSTITUTE.



NEW SERIES. No. LV.

SMITHSONIAN INSTITUTION
MAY 28 1940
NATIONAL MUSEUM

JANUARY, 1865.

TORONTO:
PRINTED FOR THE CANADIAN INSTITUTE,
BY LOVELL AND GIBSON, YONGE STREET.

CANADIAN INSTITUTE.

EDITING COMMITTEE.

GENERAL EDITOR - - REV. WM. HINCKS, F.L.S.

I. *Geology and Mineralogy:* E. J. CHAPMAN, Ph.D., Prof. of Geology and Mineralogy, Univ. Coll. Toronto.

II. *Physiology and Natural History:* REV. WM. HINCKS, F.L.S., Prof. of Natural History, Univ. Coll., Toronto.

III. *Ethnology and Archæology:* DANIEL WILSON, LL. D., Prof. of History and English Literature, Univ. Coll., Toronto.

IV. *Meteorology:* G. T. KINGSTON, M.A., Director of the Magnetic Observatory, Toronto.

V. *Chemistry:* HENRY CROFT, D. C. L., Prof. of Chemistry and Experimental Philosophy, Univ. Coll., Toronto.

VI. *Mathematics and Natural Philosophy:* J. B. CHERRIMAN, M. A., Prof. of Natural Philosophy, Univ. Coll., Toronto; and the Rev. G. C. IRVING, M.A., Prof. of Mathematics, Trin. Coll., Toronto.

VII. *Engineering and Architecture:* SANDFORD FLEMING, C. E.

VIII. *Philology:* REV. E. HATCH, B.A., Prof. of Classics, Morin Coll., Quebec.

The Canadian Journal is printed exclusively for gratuitous distribution among the Members of the Canadian Institute, and such Institutions and Societies as the Council may determine; but Members may purchase extra copies at 2s. 6d. per number, and Provincial Literary and Scientific Societies may obtain the Journal at the same rate, by an annual payment in advance.

⁂ *Communications for the Journal to be addressed to the General Editor*, Prof. CHERRIMAN, *Univ. Coll.. Toronto. Communications on general business of the Institute, to be addressed to* U. OGDEN, *Esq., M.D., Corresponding Secretary, or to Mr. Jas. Johnson, Assistant Secretary, Canadian Institute, Toronto.*

☞ MR. EDWARD ALLEN, 12, Tavistock Road, Covent Garden, London, W, has been appointed the English Agent for the Institute. All European communications are requested to be forwarded through him.

23

THE CANADIAN JOURNAL.

NEW SERIES.

No. LV.—JANUARY, 1865.

THE CENSUS OF 1861.

BY JOHN LANGTON, M.A.,

PRESIDENT OF THE LITERARY AND HISTORICAL SOCIETY OF QUEBEC.

From the Journal of the Lit. and Hist. Soc. of Quebec.

Upon the appearance of the first volume of the Census of Canada, I undertook an examination of it, with a view of ascertaining whether I could extract from it any useful results with respect to the vital statistics of this country; and especially with relation to the natural increase of the two sections of the Province. Before commencing the work, I had reason to entertain serious doubts as to the trustworthiness of the figures with which I had to deal, and at each successive step of the investigation, I only became the more convinced, that some of the figures given were manifestly wrong, and that much caution must be exercised in assuming the truth of anything that was to be found there. This was not a very satisfactory basis upon which to found any conclusions, and, in point of fact, I found that a large amount of rather laborious calculations had been entirely thrown away, from the evident worthlessness of the foundation on which they had been based. I persevered, however, because it is only from a minute analysis that any judgment can be formed of the extent to which some portions of the work may be relied upon; and I am induced to offer this paper to the Society, partly with the object of shewing what results may be considered as at least approximately correct, and partly to warn others from wasting as much time as I have done on those parts which can do nothing but mislead.

It may be desirable, as a preliminary, to explain the nature of the work performed by the enumerators. In their lists the name of each individual in a family is given, with columns to shew whether male or female, married or single, and with a column for the age next birth day. There are also columns to shew the number of births and deaths during the preceding year, and the age at which death occurred; and this is all that relates to vital statistics, or to that portion of the subject which we are examining. Now, it would appear probable *a priori*, that with ordinary care, the facts then and there present, viz.: everything relating to the persons living at the time, would be given correctly enough. I do not think that there is any reason to doubt the numbers living, the proportion of males and females, and of married and single, very nearly representing the true state of the population; and the ages would, probably, be not very far wrong, though there is much more doubt upon this subject. Many persons do not know their ages with accuracy, and many may have purposely misstated them. The tendency to guess at the age, and to call it the nearest round number, is forcibly illustrated in the Census of the State of New York, for 1855, by a diagram which shews the immense preponderance of ages stated as 35, 40, 45, &c., over all other ages. But when past facts are recorded, as the births and deaths which occurred perhaps many months before, we could hardly look for the same accuracy, and one would expect the births and deaths to be considerably understated. An error of this kind is not by any means peculiar to the Census of Canada. By the Census of the State of New York, for 1855, the total deaths recorded are 46,297, which gives a percentage on the population of 1.36, a suspiciously low rate; but in the same year, whilst the Census gave the deaths in the City of New York at 11,022, the city registers recorded 23,042. If we merely correct the manifest error in the city, the general rate would become 1.74, but if we suppose the omissions there to be a test of what they were in other parts of the State, it would be as high as 2.84; the true amount is probably intermediate between the two. A very striking illustration of the omissions which are likely to be made of facts, which occurred some time before the taking of the Census, is furnished by the United States Census of

1860. The deaths are there classified according to the months in which they fell, and whilst it is notorious from the U. S. army returns, and from the records of Massachusetts, Rhode Island, and other places where regular registers are kept, that August and September are the most fatal months, and that May gives rise to fewer deaths than any other month except June, in the Census returns, by far the largest number is recorded to have occurred in May. The reason is obvious—the Census is taken on May 31st, and the recent deaths are given probably not very inaccurately, whilst a large number of the earlier ones are forgotten. Upon this subject the superintendent of the Census remarks, in rather more poetical language than one is accustomed to find in a statistical return, that "even as the eye perceives the nearer objects in a landscape more fully and distinctly than the remote, so the recollection of past events has a similar recession, which is subject to laws." He proposes a correction from the army returns, viz.: to assume the first quarter as correct, and to add 6 per cent. for the second quarter, 46 for the third, and 58 for the fourth, which must be acknowledged to be rather a singular *law* of lapse of memory. This correction would bring the United States deaths up from 1.27, as given in the Census, to 1.56; but, without putting too much faith in any law of mnemonic perspective, it would appear more natural to assume the number given in May as correct, and to increase the whole number, in the proportion which the deaths in May by the registers bear to the whole. As thus rectified the deaths would be 1.79 per cent. But it would appear that even this is not enough, for the superintendent refers with approbation to an elaborate calculation by Mr. Meech, the exact nature of which is not stated, by which he estimates the deaths during the last fifty years to have averaged 2.2 on the population. From these facts it is evident, that with every care by the enumerators, no reliance can be placed upon the returns of deaths as given for a whole year, and that if any data upon this important subject are desired, we must establish a general system of local registration.

Very nearly the same difficulties exist with regard to the recording of births, but with this difference, that, whereas the returns of deaths cannot be corrected, except within very large limits of error, the real amount of births can be approximately recovered, if the Census as to ages be tolerably accurate. In 1851, a column of births was given, and also a column of numbers living under one year, the former being manifestly incorrect, because the returns, from one end of the country to the other, shewed a larger number living, than were said to have been born. The number living under one at the end of the year is evidently that of the survivors of those born during the year, and if the deaths under one had occurred with equal frequency in each month of the ages of the children, we should have to add on the average, one half of the number of deaths to the number living, to make up the births; but as a greater number die in the earlier months we should have to add rather more. Taking the New York Census as a guide, where the numbers dying for the first year are given from three months to three months, we should add nearly two-thirds of the deaths under one year. The births in Canada in 1851 would, upon this principle, be about 80,200 instead of 69,420, as given in the Census.

In 1861, in order to avoid this evident anomaly, I suppose, the column of births, as returned by the enumerators, and which was clearly very imperfect, was omitted altogether; but by some singular confusion of ideas, the number living under one was headed "births." I have examined some of the enumerators' schedules, and this appears to have been the course adopted in the Census office; but there is no one now left in the department who was engaged in the work, and I have not been able to ascertain the fact precisely; it is certain, however, that the column headed births is added up in the total population, as if it had been the number living under one. Assuming this to be the case, and proceeding as before, the corrected births in Lower Canada would be 43,264 instead of 40,788, and increasing those in Upper Canada in the same proportion, they would be 56,406 instead of 53,178, showing the percentage on the population respectively of 3.892 and 4.031.

The manifest imperfection of the returns, as they stand, will become evident from the following table, shewing the rates of births and deaths to the whole population from the returns of other countries:

	Births.	Deaths.	Annual Increase.
Lower Canada, 1861	3.672	1.174	2.498
do. do. as corrected	3.892	....	....
Upper Canada, 1861	3.809	.731	3.178
do. do. as corrected	4.031	....	....
New York, 1855	....	1.36	....
do. do. approximately corrected	3.078	2.300	.778
United States, 1860	....	1.27	....
do. do. corrected	....	2.20	....
Great Britain, 1859 to 1861	3.465	2.163	1.302
Russia in Europe, 1859	4.335	3.485	.850
Poland, 1840 to 1857	4.102	3.571	.531
Finland, 1857	3.503	3.251	.252
Sweden, 1851 to 1855	3.107	2.117	.990
Norway, 1851 to 1855	3.235	1.722	1.513
Denmark, 1850 to 1859	3.311	2.196	.928
Bavaria, 1852 to 1857	3.342	2.884	.458
Saxony, 1855 to 1858	3.993	2.965	1.028
Prussia, 1855 to 1858	3.831	2.928	.903
Holland, 1855 and 1856	3.184	2.536	.648
Belgium, 1840 to 1851	....	2.45	....

The rates per cent. of births in Canada, do not differ so materially from those of other countries, as to lead us to infer that they are seriously misstated; and as I have corrected them by the deaths under one, they are probably not far from the truth, though from the imperfection of the returns of deaths, they will be somewhat understated. But it is impossible to believe the rate of mortality, even if we had not other reasons for doubting it, to be even approximately correct. In connection with this subject, moreover, we encounter another source of error, the extent of which it is very difficult to estimate. We have seen in what particulars the information given to the enumerators was likely to be faulty; there is also some opening for further misstatements, from carelessness on their part in recording in their schedules the returns made to them; but, as far as the vital statistics are concerned, the forms are so simple, that I have no doubt the schedules are substantially correct. These schedules were then submitted to the Census clerks, who distributed the matter into a great variety of columns; a kind of work, which, unless a perfect system of checking be established, is always liable to produce errors. I am afraid, however, that there was no uniform system, under the inspection of a responsible head, and it is rumoured, I know not with what truth, that when the details did not correspond with the totals, from which they were distributed, the correspondence was arbitrarily forced, or, as the expression goes, the figures were cooked. If this was so, the operators shewed themselves very indifferent cooks, for numerous discrepancies still remain. I have not examined the details to any great extent, but, for the purposes of my investigation, I classified the counties of Lower Canada according to the French element of the population, and took out the ages and deaths of each class separately. I naturally checked my work, by comparing my totals after the new distribution, with those given in the tables, and I found numerous discrepancies. When I could discover no error in my own figures, I added up the columns as printed, and the result has been most materially to shake my confidence in the accuracy of the Census clerks. There were not above half a dozen errors in the additions of the columns of ages, but in the cross additions of the deaths by counties, out of sixty-five columns, of which the table consists, I found twenty-seven to be wrong. The difference between the total deaths as given, and the real total of all the details, is not very great, being respectively 12,928 and 13,103; but this is only because the individual errors balance each other. In some of the counties the difference is very great: thus in Lévis, the total of deaths is given as 142, but the details at the several ages add up to 205. As far as this particular question of the number of deaths is concerned, these errors are of little importance, because the figures, whichever way you take them, are evidently worthless, but they lead one to look with considerable suspicion upon other parts of the table, the ages for instance, where a similar distribution of the enumerators' returns has been made by the Census clerks.

I have given below a comparative table of several different countries, shewing the proportions per cent. living at different ages:

PERCENTAGE OF POPULATION AT DIFFERENT AGES.

	Canada, 1852.	L. C., 1861.	U. C., 1861.	N. Y.	Great Britain	Belgium	Norway	Denmark
		16.731	17.731	13.69	13.08	11.64	13.526	12.882
Under 5......	18.23	13.593	12.783	11.37	11.70	10.91	11.402	10.723
5—10......	13.77	12.421	12.160	10.81	10.73	9.77	9.997	9.947
10—15......	12.18	11.828	11.515	10.36	9.89	8.99	8.554	9.501
15—20......	11.87	16.806	17.660	19.87	17.46	16.62	17.423	16.187
20—30......	16.97	10.476	11.330	14.06	13.09	13.52	13.557	14.286
30—40......	10.86	7.365	7.745	9.08	9.82	11.80	8.758	10.355
40—50......	7.34	5.127	4.736	5.47	6.89	7.81	7.805	8.182
50—60......	5.43	3.244	2.667	3.11	4.51	5.49	5.690	5.010
60—70......	2.41	1.850	1.339	1.71	2.83	3.45	3.289	2.925
Over 70..........	1.28	.558	.335	.47	......	......	......	......
Unknown..........	......							
Under 20......	56.05	54.573	54.189	46.23	45.40	41.31	43.479	43.053
20—50......	35 17	34.647	36.735	43.01	40.37	41.94	39.738	40.828
Over 50..........	9.12	10.221	8.742	10.29	14.23	16.75	16.784	16.117

In spite of the marked difference which there is between Canada and all the other countries, in the distribution of the population as to ages, there is such a close resemblance between the Censuses of 1851 and 1861, as to lead to the inference that we have here a real characteristic of our vital statistics. It can only be very partially owing to immigration, for the State of New York, which is similarly affected in this respect, exhibits a very different law of population. It may be interesting to inquire what effect immigration would have upon the classification by ages. The immigration returns of the United States for the last fifty years, shew that immigrants of all ages arrive in the country, and that there is a great uniformity in the proportions at different ages in successive years. Considerably more than one-half of any importation would have no sensible effect upon such a table, as it would only add to the total numbers, without disturbing the relative proportions; and of the remaining part, the effect would be in round numbers, that 10 per cent. of the immigrants would increase the numbers between 15 and 20; 25 per cent. those from 20 and 30; and 10 per cent. those between 30 and 40. But as the whole annual immigration of late years, even in Upper Canada, has apparently rarely exceeded from 1 to 2 per cent. of the population, the numbers between 20 and 30, where the effect is the greatest, would not be very materially altered. When, however, the immigration has continued for many years, what disturbance there was, would hardly be perceptible, as the wave of excess of population, commencing between 20 and 30, would gradually extend into the higher ages, and would be succeeded by a similar wave of the descendants of the first immigrants, which would fill up the lower ages in a similar proportion. Almost the only noticeable consequence of immigration, as exhibited in this table, especially in Upper Canada, appears to be the small numbers in extreme old age, to which the wave of the great immigrations of 25 or 30 years ago has not yet reached. The great excess of the numbers between 20 and 40 in the State of New York, appears to be owing, not so much to the influx of permanent settlers, as to the temporary resort of persons in the prime of life to the great commercial centres. This tendency is more clearly visible if we take those counties alone, in which the great cities are situated, which exhibit an excess of 6 per cent. on the whole population between the ages of 20 and 40, over what is found in the country parts.

It is not easy to draw any safe inference from such a table of population, as both a high rate of births, and a high rate of mortality have a similar effect in rapidly reducing the proportionate numbers living at the several ages. Indeed, from the great preponderance in all countries of the deaths in the first few years, the two things almost necessarily go together, and an increased number of births involves an increased rate of general mortality. Such a scale, however, as that exhibited by Canada, is generally characteristic of a population growing rapidly by natural increase. If we look more into detail, many anomalies present themselves, which throw a suspicion upon the accuracy of the enumerators. Thus, it is hardly possible to conceive any law of mortality, which in five years would reduce the 17¾ per cent., said to be living under 5 years in Upper Canada, to the 12¾ per cent. living at the next period. In as far as it may be relied upon, this would point to a very large percentage of births with a fearful mortality in the earlier years. Other minor difficulties present themselves in the progress from year to year, but in its general features I am inclined to think, that this constitution of population is a true and remarkable characteristic of Canada.

Irrespective of the proportions between births and deaths, with regard to which the Census affords us such doubtful data, there are some other sources from which we may obtain an approximation to the natural increase of the population—of Lower Canada especially. The population of French origin is absolutely unaffected by immigration, what change there has been being in the opposite direction, but if we compare the Census of 1852 and 1861, the numbers of French origin in Lower Canada have increased at the average annual rate of 2.651 per cent., irrespective of those who have left the country in the meantime, which is double the rate in Great Britain, and 40 per cent. more than in Norway, which shews the highest natural increase of any European country, and seems to keep up its character as an *officina gentium*. We may even push our researches to a much earlier period. A Census of Canada was taken with great care just before the conquest. It is frequently referred to in the official correspondence of the day as in progress, but I am not aware that the exact result has been preserved. We have, however, a despatch of Montcalm, of the date, April, 1759, in which he says, that the great Census is at last complete, that he has not as yet seen it, but that it shews a population of 82,000. A Census was again taken by the British authorities in 1765. It was contained in two large folio volumes, preserved in our own library, the first of which was lost in the fire, but the second, which was saved, fortunately contains a recapitulation, shewing the population of the rural districts, exclusive of Quebec and Montreal, to have been 54,275. There is also a note to the effect that including the towns, and making an allowance for the people absent in the woods, the whole population is estimated to be 80,000. This, taken in connection with Montcalm's despatch, appears to afford us a pretty secure basis. Since that time there has been no immigration, except of a few Acadians, whilst there has been a considerable loss to the United States. But if we take the population of French origin in both sections of the Province, we shall have a pretty fair representation, though somewhat understated, of the descendants of the 80,000 Frenchmen who inhabited Canada in 1765. The French Canadians must, therefore, have increased during the 96 years, at least at the rate of 2.53 per annum.

We have also a system of registration in Lower Canada, much more perfect than anything in Upper Canada, although there is still great room for improvement. The Prothonotaries' returns for 1861 are much more complete than those for 1860, the year for which the births and deaths are given in the Census. Taking then the returns of 1851, and leaving out of account many of the counties from which no returns have been received, and others which are on the face of them imperfect, leaving out of account, also, Montreal and Quebec, I find forty-one counties with an aggregate population of 626,830, the returns from which appear to be tolerably perfect, and they shew 26,954 baptisms and 9,939 burials, which represent

Births	4.300	per cent. on the population.		
Deaths	1.586	"	"	"
Natural Increase	2.714	"	"	"

These numbers, I have no doubt are rather understated for the counties, in consequence of the imperfection of some of the returns, but the greater mortality of the cities will reduce the rate for the whole Province. To approximate to this we may estimate the remaining counties from the forty-one from which we have returns and then add the cities. Upon this principle I have included the towns of Three Rivers and Sherbrooke, amongst the counties, and I have taken the county of Quebec with the city, as they cannot be clearly distinguished in the returns. The result shews, for all Lower Canada,

Births,	4.034	per cent.
Deaths,	1.755	"
Natural Increase,	2.279	"

With a view of still further testing the subject, I analysed, with great care, the Prothonotaries' returns from 1851 to 1857, inclusive, since which latter date they have not been published. The returns for 1853 are also missing. With the exception of Rimouski, Kamouraska, Ottawa and Pontiac, the returns of the Roman Catholic Clergy seem very perfect, but those of the Protestant denominations, except in the cities, are often wanting, and when they do appear, they are obviously imperfect. I therefore only took the Catholic baptisms and burials, and the Catholic population, leaving out those counties or parishes, from which no returns were given, and rectifying the population to the date of each return by the average annual rate of increase from 1852 to 1861. This calculation, which does not seem liable to any serious objection, gives the following result for the Roman Catholic population of Lower Canada :

COUNTIES FROM WHICH RETURNS WERE RECEIVED.

	Births.	Deaths.	Nat. Increase.
1851	4.688	1.738	2.960
1852	4.827	1.778	3.049
1854	4.411	2.007	2.404
1855	4.269	2.037	2.232
1856	4.496	1.758	2.738
1857	4.256	1.698	2.558
Average	4·491	1.836	2.655

QUEBEC AND MONTREAL, INCLUDING COUNTIES.

	Births.	Deaths.	Nat. Increase·
1851	5.023	3.566	1.457
1852	5.168	3.219	1.951
1854	5.435	5.442	.....
1855	5.080	3.234	1.846
1856	4.920	3.054	1.866
1857	5.066	3.086	1.980
Average	5.115	3.600	1.515

ALL LOWER CANADA—assuming the Counties and Parishes from which there are no returns to have the same average rates as other Counties.

	Births.	Deaths.	Nat. Increase
1851	4.736	2.004	2.732
1852	4.877	1.988	2.889
1854	4.560	2.507	2.053
1855	4.395	2.223	2.172
1856	4.562	1.959	2.603
1857	4.382	1.713	2.469
Average	4.585	2.099	2.486

It will be observed that the rate of natural increase, as deduced from 1861, is quite within the limits of the variations in this respect in different years. But making every allowance for the imperfection of the returns of 1861 the smaller rate for both births and deaths in that year is very remarkable. As I before observed, the deaths naturally rise and fall with the births, from the great mortality in infancy, but this nearly constant decrease of births since 1851, seems to point to a large emigration of persons in the prime of life. Nevertheless the rate of increase is very high as compared with other nations, and it is confirmed by the growth of the French population from 1852 to 1861, and during the much longer period since the conquest.

Rate of increase of French from 1765 to 1861	2.53	per ann.
Rate of increase of French from 1852 to 1861	2.651	per ann.
Rate of increase of Catholics in counties (mostly French) from 1851 to 1857	2.655	per ann.
Rate of increase of Catholics in all Lower Canada from 1851 to 1857	2.486	per ann.

The near correspondence of the numbers arrived at by such very different methods, inspires great confidence in their general accuracy, and appears to place Lower Canada amongst the most rapidly increasing nations in the world.

In Upper Canada it is not possible to form any similar conclusion. The clergy are required there also to make returns to the Clerks of the Peace, but very few of them reach the Government. The only county, from which I can find anything approaching to systematic returns, is Haldimand, and they are not perfect enough to serve as the basis for any conclusion, even if a single county were sufficient to yield a trustworthy average. But if we cannot arrive at any such satisfactory result, as in Lower Canada, we may make some comparisons as between the two sections, as far as regards the number of births, which forms one important element of their relative rates of increase. The births, as corrected from the number living under one, according to the Census, do not differ very materially from those shewn in the Prothonotaries returns. In the 41 counties of Lower Canada, in which we can institute a comparison, the number living under one, called births in the Census, is 23,353, and if we add to it a proportion of the deaths, as before explained, the number becomes 24,653; but as the Prothonotaries' returns relate to a year later than that for which the Census was taken, the whole population, and consequently the births, would have to be increased at the average rate of about 2½ per cent. The numbers, as corrected to the same period, would therefore be 25,279 against 26,954. The main difference is in the deaths, the Prothonotaries' returns giving 9,939 and the Census only 6,498. We may, therefore, for the purpose of comparison between the two sections, take as approximately correct, the births as above deduced from the Census, viz.: Upper Canada, 4.031; Lower Canada, 3,892. This greater proportion of births to the whole population is what one would *a priori* expect from the greater number of the people in Upper Canada at the reproductive ages: but if we take the percentage on the number of married women under forty, which appears to be the truest criterion of the prolificacy of the two sections, the proportions are reversed. With a view of testing the generally received opinion of the greater prolificacy of the French race, I classified the counties in Lower Canada according to their French element, omitting the cities altogether, and I found that in those counties, containing 80 per cent. and upwards of French, the percentage of births to married women was 45.629, whilst in the rest of Lower Canada it was only 40.352, and for all the counties in Upper Canada, also omitting the cities, it was 42.772. The difference is so great and so uniform, even if smaller divisions are taken, that I am inclined to believe that it is truly characteristic, if not of the races, at least of the habits of society amongst them. How far the greater fecundity of the French may be modified by a different rate of mortality, we have no means of judging at present.

If we endeavour to discover the effect of immigration upon Lower Canada, it is observable that the general increase during the nine years since the former Census was taken has been at the average rate of 2.498 per annum, which is almost exactly the same as 2.486, the percentage of natural increase on the average of the several years from 1851 to 1857. The inference seems to be, that there has been no sensible difference between the numbers who have left Canada and the new importations. If we consider separately the population as classed under its origins, taking the figures as we find them, it would not appear that there has been any considerable emigration of the French population, for its rate of increase has been almost as great as the natural increase of the counties, and there is rather a larger proportion of French than in 1852, about 76 per cent. against 75 per cent. It is difficult to reconcile this conclusion with the general belief in a large emigration of French. Our loss in this respect may have been over-rated, or the difference may be owing to the imperfection of the Census of 1852; or if it can be attributed to neither of these sources, it would follow that the natural increase must have been even higher than I have estimated it. The numbers of foreign birth are almost the same at both periods, 96,668 in 1861, against 95,153 in 1852, showing that the importations have more than connterbalanced the deaths during the interval. The principle change is in the natives of other origin than the French, whose average annual increase, 2.019, has been much less than the annual natural increase, indicating some considerable emigration of this class, or a much lower natural increase than of the French population.

In Upper Canada, from our ignorance of the rate of mortality, it is not very easy to estimate the effect of immigration, but some important indications may be obtained from a comparison with former Censuses. The first enumeration of the people in Upper Canada with which I am acquainted, was in 1811, when the numbers are stated as 77,000. Up to 1824, when the population was 151,097, the annual increase was at the rate of 5.32 per cent. From that date until the Union we had a tolerably correct enumeration almost annually, and we may exhibit the successive additions at nearly equal intervals.

Date.	Population.	Rate of Annual Increase.
1824	151,097	
1832	261,060	8.77
1842	486,055	6.41
1852	952,004	5.62
1861	1,396,091	4.35

The last rate, which is the average for nine years, is less than the lowest recorded for any previous year, with the single exception of 1826, when it was 3.59. The greatest increase recorded is that from 1832 to 1834, the average for the two years being 10.73. This constant decrease of accessions from without, point to a rapidly approaching period, when we must mainly depend for increase of strength upon the natural growth of the people already settled in the country. A large proportion of the increase is, however, still to be attributed to immigration, and it is an interesting enquiry what that proportion may be, and how much is due to natural growth. The data are very imperfect, but we may arrive at a very rough approximation, or at least ascertain the limits within which the additions from immigration and from natural increase must have been.

If we assume the natural increase of Upper Canada to be at the annual rate of 2½ per cent., which is nearly the rate arrived at for the whole of Lower Canada, from the Prothonotaries' returns, there would remain an addition of 207,170 to the population unaccounted for, and which, on this supposition, must have arisen from immigration. The returns of the Emigration Office shew, that from 1852 to 1860, both years inclusive, 225,865 steerage passengers arrived at the ports of

Quebec and Montreal, and 123,631 appear to have come through the United States, during the same period. Of these, 181,741 are returned by the local agents as being settled in Upper Canada. Allowing for the natural increase of these at the same rate, for the mean period of 4½ years, the number would be raised to about 200,000. This appears to be the extreme possible limit to which immigration can have swelled the population, and it would require a natural increase of rather more than we have taken for Lower Canada, to account for the remainder.

But the numbers who are supposed to have permanently settled in the country, are probably stated too high, and there has notoriously been an emigration of persons living in Upper Canada before 1852, which must have most materially reduced the balance. The numbers of foreign birth living in Upper Canada in 1852, were 399,494, which, in 1861, had become 493,212, making an increase of 93,718. All of these must have been immigrants, and there must have been as many more as would replace those of the 399,494 who had died. As a great number of them would be in the prime of life, we can hardly estimate the rate of mortality as high as 1 per cent., but, even on this estimate, the numbers of new emigrants would only be about 128,000, or with their natural increase as above, abont 140,000, so that the increase based on the Emigrant Agents returns, would appear to be overestimated. But, on the other hand, the United States Census shews that the natives of British America had increased from 147,200 in 1850 to 249,970 in 1860. The several provinces are not distinguished in the United States returns, but in the State of New York, in 1855 the Canadians were rather more than nine-tenths of those from all British America. Even allowing that in Maine and other Eastern States, a larger proportion may have been from New Brunswick and Nova Scotia, and that there were certainly many Lower Canadians amongst them, it is hardly too much to assume that of the 102,000 added to the population of the United States, one-half were from Upper Canada. This would leave a very small balance in favour of Upper Canada, certainly not as much as 100,000. If we estimate the whole accession due to immigration at that amount, it would require an average rate of natural increase to account for the whole number, of at least 3½, which appears much higher than is probable. The truth probably lies between the two limits as thus arrived at, but it seems certain that the natural growth of the population in Upper Canada must be more rapid than that of Lower Canada.

I have been induced to enter into these details partly with a view of shewing what conclusions we may draw, with some degree of confidence, from the statistical data to which we have access, and partly to point out the extreme insufficiency of these data, and the doubts which must rest upon many points of the utmost importance in relation to the future prospects of our country. My labour will not have been in vain, if any one should be induced by the observations I have made to press upon the Legislature the necessity for organizing some system upon which more trustworthy statistics may be obtained. The main things which appear to be wanted are—a more perfect organization for collecting and tabulating the facts, and a greater frequency in the returns by a compulsory local registration. The decennial census would still be necessary, as there are many important facts, which it would be too cumbersome and expensive to attempt to collect at shorter intervals; but there are also many details which could easily be recorded annually, and which could then be obtained with much greater accuracy. Not the least advantage to be derived from a more frequent registration would be, the preparation which it would supply for conducting properly the more perfect decennial Census. The collection, tabulating and discussion of the multifarious details of a great Census, simple as each individual process appears to be, require some special training in those who are engaged upon it, and a well devised system of checks under a responsible head, to prevent the recurrence of such gross errors as are to be found in the two last Censuses. It is hardly possible to expect any much better result to follow from the returns of enumerators, who have had no experience in the work expected from them, and from submitting their schedules to a body of extra clerks, called in for the occasion, who appear to have worked without concert, and almost without supervision.

The system which I would recommend, as most likely to produce a valuable body of statistics, would be the following:—It might still be desirable to require the clergy of the several denominations to make returns of their marriages, baptisms and burials, as at present; but the baptisms and burials after all only approximately represent the births and deaths, and experience has shewn that it is almost impossible to obtain, in this way, punctual and correct returns; and in Upper Canada especially, as in other countries where there are a great variety of religious denominations, it would be hopeless to expect any accuracy from such a source. These returns might act as a check upon the facts as otherwise obtained, but there can be no system of registration approaching to completeness other than a compulsory civil registration, as in England and most European countries, and in some of the states of the neighboring Union. Every person should be bound under a penalty to register with some local officer, within a given time, every death or birth occurring in his family, and in order to remunerate the officer, and to give him an interest in the completeness of the registry, a small fee should be payable to him on each entry. I would take advantage as far as possible of our present municipal organization, and, in Upper Canada at least, the local officer might be the township clerk. As the township clerk is often changed, and as there is generally no proper office in which the registers could be safely kept, I would require the township clerk to file the originals with the registrar of the county, at the end of every quarter. These registers, besides their use for statistical purposes, would serve as an authentic record of births and deaths, which, together with the registration of marriages, which is already made in the registrar's books, would be always open for reference in questions of succession to property. Both objects should be kept in view, and the form of the registers might perhaps be something like the following :—The township clerks might be supplied by the registrar with sheets ruled in columns shewing, for births—date of birth, sex, name, father or mother's name, signature of person making the registry, date of registry; and for deaths—date of death, name, age, disease, signature of person making the registry, date of registry. Each sheet, when returned to the registrar, should bear the certificate of the clerk. In Lower Canada, where the municipal organization is not so perfect, it might be desirable to have some other local registrar than the township clerk, and the sheets might be deposited as at present with the Prothonotary; but the forms, and as far as possible the system, should be uniform in the two sections, and the registration should be that of births and deaths, and not merely the ecclesiastical record of baptisms and burials.

It should also be incumbent upon the assessor to have a column in his roll for the numbers in each family. This used always to be done in Upper Canada before the union, and gave very little trouble, and the numbers under fifteen are still given for school purposes. It might be desirable to distinguish males from females, and to have some general classification as to ages, as under 5, 5–15, 15–40, above 40, but it would not be wise to enter into too much detail. This portion of his roll should be made out separately, and should be handed over by the clerk to the county registrar.

I would throw upon the registrar the duty of compiling from these materials the returns to be made annually to government, on forms to be furnished to him, which should not enter into too much detail, and I would pay him out of provincial funds for the work. The remuneration need not be very high, and the total cost would be quite an insignificant item ; but I hold it as a most essential part of any such scheme, that everybody should be paid for the work imposed upon them. It is the only way in which correct and punctual returns can be expected. However conscientiously even the best men may perform any act required of them as a duty, they will do it more readily and more certainly, if besides discharging the duty, they make $20 or $30 by the transaction.

With such an organization, we should have a certain set of men all through the country, the assessors, the township clerks, and the registrars, who had already some experience in the kind of work, and they would form a useful material, out of whom to select the enumerators and commissioners, when the more formal Census came to be taken. There would remain the organization of the department of government, on which would fall the duty of classifying and tabulating the returns received from the whole country. The returns of vital statistics would form only one portion of this work. The statistics of trade and navigation, of railways, of banks, savings banks, building societies, insurance companies, hospitals and charities, and schools, criminal and other judicial statistics, militia and municipal statistics, should all be ultimately combined into one annual volume. The preparation of these, and still more, the devising of the best forms in which the information should be collected, and presented to the public, would require much miscellaneous knowledge and experience, which could hardly be expected to be found in any one department. There should be a board of statistics, presided over by one of the Executive, and of which some others of the ministry, the minister of finance especially, might be members. But the real work would fall upon the deputy heads of those branches, which are especially concerned with the subjects embraced in the general plan, and who should also be members of the board. The business of the board, as such, would be almost exclusively deliberative—to decide upon what information should be collected, and to devise the best forms in which it should be submitted, so that the statistics of one branch might harmonize with, and throw light upon, those of another. I may give an example of what I mean: The trade and navigation returns shew the amount of timber and lumber exported, and the report of the Commissioner of Crown Lands gives the statistics of the several timber agencies; but from want of concert between the two departments, the forms in which the returns are exhibited make it impossible to connect the two sources of information upon this most vital portion of our industry, so as to trace the article from the various sources from which it was produced, to the quarters in which it found a market. The board would only lay down a general plan; the individual members would each be responsible, as part of the business of his own department, and with his own staff, to collect the information required. The only other thing required, besides the occasional assistance of copyists, would be a thoroughly competent secretary, with perhaps, one clerk, who would collect some of the returns, and superintend and publish the whole.

REMARKS ON THE PRINCIPLES OF CLASSIFICATION IN THE ANIMAL KINGDOM, IN IMMEDIATE REFERENCE TO A RECENT PAPER BY J. W. DAWSON, LL.D., F.R.S., PRINCIPAL OF McGILL COLLEGE, MONTREAL.

BY THE REV. WILLIAM HINCKS, F.L.S.,
PROFESSOR OF NATURAL HISTORY, IN UNIVERSITY COLLEGE, TORONTO.

(Read before the Canadian Institute, January 28th, 1865.)

THE number of the *Canadian Naturalist*, for August, contains a paper by Dr. Dawson, of Montreal, (of which he has also obligingly favored me with a separate copy), entitled "Elementary Views of the Classification of Animals." The opinions of naturalists on the subject of classification being, at present, very unsettled; so that the greatest names of thoughtful observers of nature, and useful labourers in bringing to light new facts, may be quoted in support of the most opposite methods, and teachers in different schools are exceedingly likely to vary in their plans, if my esteemed friend Dr. Dawson's views had differed very widely from my own, I should neither have been greatly surprised, nor have thought myself at all called upon to enter into controversy with him on the subject. But when I find in his paper a remarkable agreement on what are, certainly, the most important points, with the principles I have maintained and taught for a good many years, and where he differs from me in matters of detail, which are still of great interest, that he has given his reasons concisely and clearly, so as to afford the opportunity for a candid discussion of the merits of the case, I am tempted, at once, to express my sense of the great value of much of what he has done, and to ask the attention of the lovers of natural science in our Society to the reasons which prevent my agreeing with the author on certain points, and seem, to me, to justify different conclusions. Any notice I may take of the points, in my view the most important, in which I agree in opinion with Dr. Dawson, is not intended to add to the weight of his statements by my humble approbation; but simply to make it understood how far we proceed together, where many others take a different course, and what the questions are which I propose to discuss: questions which, though in some respects subordinate, have all the interest which arises from extensive practical influence on our arrangements. Dr. Dawson's remarks on species seem, to me, just, and of fundamental importance, deserving the attention of all students of natural history, and well fitted to counteract some prevalent errors.* The section on "genera and higher groups" is, also, in general accordance with my views, and seems to me a well considered statement of great principles; but I would venture on one or two observations, occurring to me, in connection with it. The author having laid it down that "in comparing species with each other, for purposes of classification, there are four distinct grounds on which comparison can be made: 1st. ultimate structural, or anatomical resemblance; 2nd. grade or rank; 3rd. use or function; 4th. plan or type;" proceeds to explain the value and mode of use of each of these, in remarks well deserving attention. I must, however, hold to be very doubtful the opinion of Agassiz, here adopted by Dr. Dawson, that difference of grade and rank is to be specially used for grouping genera into orders. Order is the name employed in natural science to express groups of organisms, next in extent to what are called classes, which were formerly regarded as the primary divisions of the kingdoms of nature; though, with increasing knowledge, it has been found necessary to interpose sub-kingdoms, or branches. I have not yet been able to appreciate the reasons why groups of one degree of comparative extent, should be founded on a different kind of characters, or a different mode of considering them from those of either a higher or lower degree; and, practically, I must maintain that there is a gradation of ranks in the sub-kingdoms of each kingdom, in the classes of each sub-kingdom, and in the families and sub-families of each order, as well as in the orders of a class. Nobody doubts that Vertebrata is the highest sub-kingdom of the animal kingdom. Mammalia is universally received as the highest class of Vertebrata. Aves comes next, then Reptilia, and Pisces takes the lowest rank; whilst those who admit Amphibia, insert it between the last two. Grade, or rank, is not then used, only or chiefly for orders, and neither are the orders usually admitted founded exclusively upon it. On the other hand, when two groups have manifestly a common plan, and corresponding sub-divisions, but differ greatly in grade of development, they are now usually regarded as sub-classes of one class, whilst their corresponding sub-divisions are called orders, a practice entirely at variance with what is here laid down. Dr. Dawson alleges, as an instance of a grave error, arising from the improper application of difference of grade or rank, "the attempt of some naturalists to establish a province or sub-kingdom of *Protozoa*, to include all the simplest members of the animal kingdom." I am afraid I fall under my friend's censure in this matter, as being one who deem the admission of Protozoa, as a sub-kingdom, necessary for the right interpretation of the system of nature; but I must protest against being supposed to defend their separation on the ground of their inferiority of grade, though they, undoubtedly, occupy the lowest grade in the animal kingdom; and, I think, on reconsideration, Dr. Dawson will find that, whilst the name Protozoa is proposed for an assemblage of low forms of animal life, possessing certain remarkable common characters, those who have adopted it have carefully excluded other almost equally low forms, which display the characteristics of any of the other sub-kingdoms. If the principal characters be negative, which is very apt to be the case with the lowest division of any great group, as being what is left when the others are withdrawn, and known by the absence of all their distinctive peculiarities, yet, if the remnant of the animal kingdom which cannot, with any appearance of propriety, be referred to any of the four recognized plans of structure, consists of beings considerably resembling each other in substance, vital functions, and the means by which these are performed, so far as they are known, a tolerably secure foundation is laid for the fifth sub-kingdom ; and, if all its members, as in the case of Radiata, may be referred to three distinct classes, (Porifera, Rhizopoda, Ciliata,) this analogy with the nearest sub-kingdom confirms the argument. Agassiz is the most formidable opponent of the separation of Protozoa, and every opinion of his deserves to be carefully weighed, and treated with respect ; but, in the present case, we find him obliged, in opposition to the views of all who have most carefully studied them, to send back the Sponges to the vegetable kingdom, and, in defiance of recent exact observation, to return to the old plan of treating Foraminifera as low forms of Cephalopods ; besides that, because his own acute observation had proved some supposed Ciliata to be embryonic forms of higher animals, he, too hastily, concludes that all the Ciliata will probably admit of the same explanation, although of some of them the whole life-history may be said to be ascertained. I cannot but think that, in this case, a preconceived opinion established in his mind, and, having a fixed place in his general system, has prevented this great naturalist from perceiving the truth with his usual sagacity. I, at least, find my convictions strongly opposed to this opinion of Dr. Dawson, high as is the authority by which he might support it.

---

* I must confess that I cannot help desiring a more satisfactory definition of a species, than a group of individuals which may have had a common descent. I have thought of something of this kind: a group of beings, having similar organs for the performance of the vital functions, disposed precisely on the same plan, and—allowing for differences of age or sex, and minor peculiarities, shown by experience to be unimportant,—developed in the same relative proportion. If, however, this definition could be made entirely unobjectionable, as clearly marking all that enters into the received idea of a species, it would, of course, leave questions respecting their origin and permanence exactly as they are, and we could go no farther without assuming the very points which require proof, so that nothing can be practically gained in this direction.

In the section on the general nature of the animal, the distinctions between the animal and vegetable kingdom are by no means free from objection. The first is merely verbal, since eggs and seeds are essentially of the same nature, and cannot always be distinguishe

The third is hardly correct, since the lowest animals have no apparent nervous or muscular system, and, in their case, we cannot be sure of *voluntary* motion. Spontaneous movements are seen in many plants. The fourth is a mere assumption, not affording the least assistance as a means of distinction. Sensation cannot be proved in the lowest animals, nor its total absence in plants; and there are animals without organs of sense, or any distinct nervous system. Even in the second distinction, it is hardly safe to refer to the animal building up its tissues chiefly of nitrogenized matter, since some known animal tissues are of the same nature as cellulose, and nitrogen is found in the protoplasm in every active vegetable cell. The best distinctions seem to be, that in the animal the means of absorbing nutriment are within the animal frame, the food being brought within the body before it is placed within reach of the absorbents, whilst in the plant the absorbents are external; and that the animal is nourished by organized substances, animal or vegetable, fresh, or more or less decaying, whilst the vegetable lives upon water, gaseous substances, and salts or metals, in a condition to be dissolved in water, but never directly upon organized matter. Dr. Dawson has here expressed widely prevalent views, presented, in some form, in most introductions to zoology and botany; and, though hardly necessary to my object in this paper, I have taken the opportunity of giving my reasons for rejecting some of the tests commonly recommended for distinguishing the kingdoms. The remainder of the section, in establishing the four general characteristics of the animal, attempts to lay the foundation of that quaternary system in zoological classification which the learned and ingenious author is disposed to favour. As sensation, motion, nutrition and reproduction are the four great functions of animal life, it is concluded, not without great plausibility, that the predominance of each of these in turn will constitute a great division of the animal kingdom, whilst under each of these again a similar cause will produce four secondary modifications, and so on through all the variations which occur. I am myself well persuaded that the beautiful harmony of plan, which claims the perpetually renewed admiration of the intelligent observer of nature, is due to certain tendencies of development in respect to the great functions of life, which, after being manifested in the great branches or sub-kingdoms, are repeated under each secondary type, so as to cause the number of groups at each step in subdivision to be, so far as they exist and are known to us, the same, but whilst thus far agreeing with Dr. Dawson, and valuing highly his testimony in favour of a great principle, I cannot agree with him as to the actual number of these distinct tendencies which I am compelled to estimate as five instead of four. In regard to the primary division of the animal kingdom into sub-kingdoms or branches, after granting the excellence of the four established by Cuvier, and fully agreeing in Dr. Dawson's judgment respecting Coelenterata, Molluscoida, and Annuloida, I find myself compelled to accept the additional group of Protozoa, because there are many living beings with structural peculiarities adapted to their designed mode of existence which have no relation in their plan of structure to any of the other four sub-kingdoms, and which, notwithstanding remarkable differences among themselves, agree together in the nature of their substance and the simplicity of the means by which the functions of life are carried on. The very illustration drawn from architecture which Dr. Dawson has used to justify his rejection of Protozoa, seems to me to shew the necessity of admitting it as a branch, for surely if I were required to give an account of all human habitations arranged according to their nature, I must not only notice the distinct styles of the higher architecture, but the rudest huts and hovels and the simplest tents must also be described, and their few common features with the absence of the characteristics of the higher styles would bring them together as a class. So when I attempt as a zoologist to give some account of the whole animal kingdom, I must not entirely neglect any really existing group, and if I find many forms which can with no appearance of reason be referred to any of the former plans with which we first become acquainted, although their extreme simplicity must make their characters chiefly negative, I must place them together as a fifth sub-division since there is no other course which would not render the characters of the others nugatory. To me, again, it is an argument in favour of receiving the Protozoa, that, notwithstanding their extreme simplicity and minuteness, they naturally fall under three distinct classes: Rhizopoda, Porifera, and Ciliata, which seem to include them all the very number of classes corresponding with the next lowest sub-kingdom, Radiata and differing from the others only by the absence, of the two higher tendencies which are not specially manifested in these low forms of living beings.

If we can establish five great branches of the animal kingdom the presumption, according to principles admitted and well supported by

Dr. Dawson, will be in favour of five classes to a sub-kingdom, and five sections under each distinct type as we go on with our subdivision, and looking to the actual fact in respect to what seem the most satisfactory arrangements in various portions of the animal kingdom, I find this view confirmed, the remarkable exception in the sub-divisions of the two lowest branches and, as I think, also in the vegetable kingdom, when properly explained, only making the general law more certain. But since Dr. Dawson has given us the four classes which appear to him good and sufficient in each of the sub-kingdoms, I will review these in order to bring my own system into fair comparison with his. In Vertebrata he includes Mammals, Birds, Reptiles and Fishes, omitting Amphibia which he agrees with many others in making an order of Reptilia, considering the distinction to consist chiefly in rank or grade and to be therefore of a secondary kind. It cannot fairly be denied that the remarkably close correspondence of the divisions of Amphibia with those of Reptilia favours this view supposing us to make them, not an order of Reptilia, but a sub-class, an outer circle of corresponding but more rudimentary forms, like the relation of Entozoa to Annulata, but even thus the embryonic and anatomical differences are too strong not to suggest the propriety of their being accounted distinct classes, and the other instances which occur in which, in a natural circle, the third division is terrestrial, the fourth ambphibious, (living partly in water, or near water, from which they derive much of their food), the fifth aquatic, strengthen our expectation of an intermediate class between reptiles and fishes of just such a character as belongs to Amphibia. Dr. Dawson in a note on this point says: "The *Amphibia,* as Dana well argues on the principles of cephalisation, are clearly reptiles, because we arrange animals in their mature and not in their embryonic condition, and because the points of reproduction in which Amphibia differ from ordinary reptiles, have relation to an aquatic habit, aud are ordinal or rank characters merely." Elsewhere, also, he objects, and very justly in my opinion, to "basing classification wholly on embryology, or on mere anatomical structure." The truth, I apprehend to be, that in endeavouring to recognise the really distinct types which occur in nature, we employ combinations of various characters, and we succeed so far only as we give its due value to each. There are striking anatomical differences which are only adaptive modifications in respect to secondary dlfferences of mode of life, though a mere technical anatomist might exaggerate their importance; yet anatomical characters deserve the most careful study, and in innumerable instances furnish the most valuable tests where external form or habit might deceive us. So embryology is one of our best guides in determining fundamental differences of structure, though some of the differences it brings under our notice are secondary, and must not be made too much of. Let us duly weigh the embryological and anatomical differences between Reptilia and Amphibia, in respect to their number and value, and we may perhaps see our way to a satisfactory conclusion. In Amphibians the eggs, as in Fishes, are excluded before impregnation, and are always destitute of any hard protecting covering. There is also, at the commencement of developement, the same partial segmentation of the yolk as in fishes. Again, the alantois and amnion are wanting in Amphibians as in Fishes, present in Reptilia as in Birds and Mammals. In Amphibia, progressive changes which in Reptilia, as in higher animals, take place within the egg, occur after the exclusion of the young animal, constituting its metamorphoses which are specially manifested in the higher members of the group. These seem sufficiently striking and important embryonic characters. Turning to those which belong to the matured structure, we notice the naked skin distinguishing Amphibia equally from Fishes and Reptiles, and to which the only exception perhaps is Lepido siren, if we may assume, in opposition to the high authority of Owen, that on the whole Amphibian characters prevail in it over the Piscine. In Amphibia the two modes of aeration by lungs and gills, the former of which is suppressed in Fishes, the latter in Reptilia and the higher animals, co-exist either during the whole of life or at least in its earlier stages. In Amphibia the ribs which are highly developed both in Fishes and Reptiles are absent or only rudimentary, and the connection of the bones of the head with the atlas is by two articular tubercles, instead of one as in Reptilia and Birds, a structure apparently connected with the imperfect development of the bones of the skull in Amphibia. Without seeking other characters, these seem sufficient to show that Amphibia occupy a well marked intermediate position between Reptilia and Fishes, and it may be doubted whether most of the classes of the animal kingdom have more striking and decisive distinctions, though the long practice of naturalists in combining them with Reptilia and the near resemblance of the analogous forms are apt to confuse our ideas on the subject. The circumstance that

Amphibia, whilst possessing striking peculiarities of their own, both external and internal, and in general appearance more resembling Reptiles, yet in their early embryonic development agree with Fishes in opposition to all the higher classes, seems to me decisive as to their distinct position.

On the second sub-kingdom, Articulata, I need make but few remarks. I agree entirely with Dr. Dawson in placing Arachnida as the first, or what he calls the nervous class, which manifests the highest development of which the type is capable, and I am pleased to have his support in this view in opposition to the misleading influence of a false analogy.

I differ from Dr. Dawson in believing that the predominance of the Nutritive system, is expressed by two different plans of development, thus introducing a fifth type of structure. The one tending to fulness of figure and the use of the ordinary modes of appropriating food, but without violence being required for the purpose, and accompanying terrestrial habits of life when at all suited to the prevailing structure; the other tending to an elongated figure, to a suctorial or anomalous mode of appropriating food, and, usually, to semiaquatic habits of life. Of course I regard Worms (Annulata) as the second nutritive type, and the question with me is, whether a fifth great group can be found in the sub-kingdom, suitably representing Dr. Dawson's embryonic or reproductive class. Now those who have read a few of the popular works on Zoology will have been asking themselves how it is that Dr. Dawson's arrangement overlooks the Rotatoria or Rotifera—the wheel animalcules to which their attention has been directed in those works. We must presume that he has thought that they might be treated as low forms of Annulata or Crustacea, and having thus disposed of them to his satisfaction has not felt obliged to speak of them in so general a view of the subject as his paper offers. Nevertheless, the characters of the class are very clear and definite; the discussion which has been carried on by eminent zoologists as to its nearer relationship to Crustacea or Annulata have served to establish its distinctness from both, whilst proving its direct affinity especially with the latter; and whatever may seem rudimentary in its structure especially suits its position as the embryonic class in its sub-kingdom. There are so many high authorities for its being considered as a class, that at present I need do no more than point out how exactly it is suited to the place I assign to it, completing the five classes of Articulata.

Passing to the sub-kingdom Mollusca, we find Dr. Dawson giving as the four classes, Cephalopoda (about which and its position there can be no difference of opinion); Gasteropoda, in which he includes Pteropoda; Lamellibranchiata; and Molluscoida. I must begin by remarking that the latter name is entirely inadmissible, having been intended by its author to designate a distinct sub-kingdom, so far resembling or approaching Mollusca as to be well named from that circumstance, but not regarded as included in them. When the group so designated is received as a class of Mollusca, a more suitable name must be found. In this I have no doubt that Dr. Dawson agrees with me, though in drawing up this paper he did not judge it necessary to introduce a new term, indicating the animals intended by one already applied to them. I would also propose it as a query whether the Palliobranchiata or Brachiopoda are not better considered according to Vander Hoeven's method, as a sub-class of the same group with Lamellibranchiata, to which as a whole the name Conchifera may be appropriated. It is more important to observe that Gasteropoda have no pretensions, even among the sluggish Mollusca, to be regarded as a *motive* class. Their place is as representatives of the higher nutritive development, whilst Conchifera, both in their mode of appropriating their food and in their general figure, express the lower nutritive or fourth class, and allowing Tunicata, of which *Polyzoa* (I must ask pardon for another verbal criticism, but surely the law of priority gives our distinguished countryman Thompson's name a right to be preferred to Ehrenberg's name, Bryozoa), are only a sub-class, to be rightly placed, we have but to restore the active Pteropoda to their natural and generally admitted position as a class, which a critical examination of their structure would most fully justify, to find the five tendencies fully represented in this sub-kingdom; and I submit that in this and the previous case respecting Articulata, it is not I who am chargeable with creating a class on slight grounds to support a theory, but my friend who sees the arguments for suppressing these classes magnified to his view by the requirements of his theory.

I have sufficiently expressed already my objections to Protozoa being numbered with Radiata, to which they have, so far as I can see, no real structural resemblance, and receiving them as a sub-kingdom

I have named the three classes into which they may be divided. I have also given a reason why it seems to me reasonable to expect only three instead of five classes in the two lower sub-kingdoms in which there can hardly be said to be any special development of the powers of sense and motion, the nutritive and reproductive systems completely predominating. If it were allowable on this occasion to enter on details respecting the sub-divisions of the classes, I could easily show, as I have on other occasions endeavoured to prove in this place in respect to the more important classes of Vertebrates, that the number five, not three, four, seven, or any other that has been proposed, is the number of natural tendencies appearing, and continually repeating themselves in the divisions of the animal kingdom, and thus producing the order which prevails throughout nature. Our author's seventh and last section relates to the division of classes into orders and families. I have already referred to the higher of these divisions, objecting to the opinion that grade or rank has any special appropriation as a character to orders, and I may add that I assign more importance to families, and regard them as more definite groups, than Dr. Dawson appears to do. It is an ingenious idea that the distinctive characters of orders in each class are mainly derived from the function which the class represents, "for example, the orders of Birds, Insects, Gasteropods, and Acalephæ should be ascertained chiefly by reference to the locomotive organs as being the system of organs most eminently represented in the class," but I question its being in strict conformity with facts, since on the one hand the organs of motion have been much employed as class characters in the sub-kingdom Mollusca, which is the reverse of being specially concerned with motion, and on the other, I must hold it to be reasonably denied that either Gasteropods or Acalephæ at all represent the motive tendency, and granting that they did so, and omitting to insist now on the Pteropods being a genuine class, what can be said of a sub division of Gasteropods which does not recognise as orders Pulmonata, Siphonophora, and Holostomata. The orders of Insecta generally received are exceedingly unsatisfactory, and demand revision, and those of birds depend more on the kind of food and mode of securing it as indicated by the structure of the beak and feet than on the proper motory organs. In most cases, it appears to me, where grade or rank is a special ground of distinction it leads us to sub-classes, represented by concentric circles, in each of which we find corresponding sets of *five* orders, representing in their degree the five tendencies.

With respect to families, I cannot but observe how each good order contains five good families, each family, when large enough to be sub-divided, five sub-families with the same representative character, and it is probable that so far as good divisions can be carried they will maintain the same relations. In this view, as conforming to the law of the number of tendencies, on the expression of which in each sub-division the order of nature depends I presume to think families as necessary to be considered as the larger sections, of which they are component parts. The paragraph respecting the errors of specialists I hold to be sound in principle and deserving of most careful attention, and with it I reach the termination of the task I had imposed on myself. In conclusion, let me repeat that I have been induced to submit to examination in a spirit of sincere respect, and high appreciation of its value, the paper of my friend Dr. Dawson, on a subject to which the members of this Institute know that I have for years given much attention and thought, chiefly because there is so much more in which I entirely agree with him than in similar expressions of opinion by other naturalists, which creates a desire of bringing to the test of examination the remaining points of difference, partly also by the circumstance of his essay falling into the hands of many of my pupils and correspondents, so as to create a desire to give my own views the same advantage, and allow of their being fairly compared with those which prevail around us. In the present state of our science, exact agreement of opinion on the more speculative questions which it suggests cannot be expected, and I should be among the last to lower my estimate of Dr. Dawson's eminent attainments and useful labours in the field of science because he counts classes a little differently from what I do; but I think it may promote inquiry, and create some interest, to bring a different practical application of our common principles into fair comparison with that which he has proposed.

ON ERRATA RECEPTA, WRITTEN AND SPOKEN.

BY THE REV. DR. SCADDING,
LIBRARIAN TO THE CANADIAN INSTITUTE.

(Continued from Vol. IX. *p.* 326.)

III. Foreign Words Anglicised—(*continued*).

2. *Anglicised Italian Words.*

We have already seen that our familiar word *ink* represents the Italian *inchiostro,* a corruption of *encaustum,* a term expressive of the caustic, biting character of the old writing fluids. *Ream* also, denoting a certain quantity of paper, is the Italian *risma,* an abbreviation of *arisma,* which is from the Greek *arithmos.*—*Pencil,* looking as if through the French *pinceau* it were allied to *pennello,* an Italian diminutive of *penna,* is in reality *penicillum,* its classical synonym.—*Desk,* so associated in our minds with the act of writing, is *desco,* the Italian form of *discus,* and means simply a circular table. *Dais* for the upper table in the dining-hall, is the same word. This term, its origin having become obscure, acquired the sense (1) of the tester or canopy over the principal seat at the high-table; and (2) of the raised step on which the high-table was placed.—*Desco* is also used in an abstract sense, as "Chair" in English, for "Chairman" and the authority temporarily vested in the Chairman of a public assembly.

Roll (of papyrus for example, or parchment), keeping somewhat nearer its original than the French *rôle,* comes to us from the Italian *rotolo, ruolo,* which is the Latin *rotulus.* A duplicate or check-roll was in French a *contre-rôle.* Hence *control.*—Our *invoice* is the Italian *avviso* (*ad visum*), to which we have adhered more closely in the commercial phrases "advise," "letter of advice."

"Policy", in the expression "policy of insurance", is borrowed from *polizza,* a corruption of *polyptycha* (pl.) a Greek word denoting a set of writing tablets with many leaves. *Diptycha* for a *pair* of such tablets, is a more familiar word.*—A *register* (Ital. registro) is properly a document in the papal archives—a book in which the gesta of the pontifex maximus *regeruntur*—are orderly recorded for reference. We have but slightly changed the word *protocol* (Ital. *protocollo*), but we have departed to some extent from its first acceptation.—The increase of forgeries induced Justinian* to give orders that no public documents should be held valid which were not written on a certain kind of paper, on sheets having inscribed on them by authority the name of the *Comes largitionum* for the time being. Sheets with this inscription as a heading duly attached were termed protocols (*protos, colla-ein* to affix). In diplomacy the documents which form the groundwork of negotiations between imperial or regal plenipotentiaries are still called protocols. Such papers are accredited as issuing from the crowned heads themselves.

---

* As a mere guess, *pollex,* the Latin for the *thumb,* has been suggested as the original of this term, the thumb having been employed symbolically in making agreements. "Policy", denoting a line of conduct, has an origin entirely different.

---

* Vide *Novellae Just.*, *Constitutiones*, xiv. c. 2. (A.D. 537.) Illud quoque praesenti adjicimus legi, ut tabelliones non in aliâ chartâ purâ scribant documenta, nisi in illâ quae in initio (quod vocant protocollum) per tempora gloriosissimi comitis sacrarum nostrarum largitionum habeat appellationem, et tempus quo charta facta est, et quaecunque in talibus scribuntur: et ut protocollum non incidant, sed insertum relinquant: novimus enim multas falsitates ex talibus chartis ostentas et prius et nunc: ideoque licet aliqua sit charta (nam et hoc sancimus) habens protocollum non ita conscriptum, sed aliam quandam scripturam gerens, neque illam suscipiant, tanquam adulteram, et ad talia non opportunam, sed in solâ tali chartâ qualem dudum diximus, documenta scribant. Haec itaque quae de qualitate talium chartarum a nobidecreta sunt, et de incisione eorum quae vocantur protocolla, valere in hâc felis cissimâ solum civitate volumus, ubi plurima quidem contrahentium multitudo, multa quoque chartarum abundantia est, et licet legali modo interesse negotiis, et non dare occasionem quibusdam falsitatene committem, cui se obnoxios existere demonstrabunt, qui praeter haec aliquid agere præsumpserint. To this Godofredus (*Corpus Juris Civilis*, Tom. iii. Col. 115.) adjoins the explanatory note: "Protocollum non est major et regia charta velut quidam opinantur: nec est scheda negligentius scripta. Non est etiam exemplar formularum quo tabelliones uti solent: sed brevis adnotatio, quae declarabat quo Comite largitionum (sub cujus curâ erant chartariae), quo tempore et à quo praeparatae fuissent chartae."—In "quidam opinantur" Godofredus probably glances at the definition in Calepinus: "Proprie dicitur illud quod breviter et succinctè à tabellione notatur, ut postea per otium quoties opus, latius possit extendi." Calepinus then refers to his remarks under *Macrocolon*, where he says that *macracola* are "majores et longiores chartae, quas nos hodie *chartas regias* vocamus;" but he does not say this of *protocola*. Previous to Calepinus, Tortelius *De Orthographiâ* had also given as one of the interpretations of *protocollum*—" prima illa et raptim confecta scriptura quae aliam magis compositam desiderat." The notion is admitted by both Calepinus and Tortelius that *colon*, i.e. *membrum*, is a factor of *protocollum*.—Meursius, *Glossarium Graeco-barbarum*, p. 460, defines *protocollum* to be "Liber in quo acta à tabulariis perscribebantur."

Pumice, employed in the preparation of parchment for the reception of writing, is the Italian *pomice,* and this, of course, the Latin *pumex.* The French have transformed the word into *ponce,* whence our *pounce* and *pouncet.* Our *sketch,* which the French have made *esquisse,* is the Italian *schizzo,* derived from the Greek *schedios,* which denotes what is done impromptu, with such means as are at hand at the moment. *Caricatura* is an over-*charged* or exaggerated sketch. It is akin to *charge,* and oddly to *cargo,* through the French *charger,* which is in fact the Italian *caricare,* to load, &c. *Motto,* like *ditto,* we have bodily adopted. The French have made out of it *mot.* The original word is *muttum,* a late Latin derivative of *mutire* to mutter.

Some words in English connected with dress, with the material, ornaments, and colour of dress, &c., are disguised Italian. *To dress* —the act itself—is from *drizzare,* and this from the Latin *dirigere* to arrange.

Camicia has given rise to the name of a vestment which in English has a more restricted application than it has in Italian and French. Its root is disputed. Some are for the Celtic *caimis* shirt; others for *cama,* Latin, a bed. The ecclesiastical *camise* is the same word. *Camisade,* for a night-attack, in the light of this derivation, becomes picturesque. We see the men with their white *camicie* thrown on over their corselets.—*Pantalone,* i.e. the Christian name Pantaleon, on the Italian stage used to be the Venetian. He has given name to a very familiar portion of our dress.—*Gabardine,* not unknown to the reader of Shakspeare, is, through the Spanish, the Italian *gabbano,* a coarse cloak, called in the south of France still a *gaban,* which is identical with *cabane,* as though a cloak were a portable *hut* for shelter.—*Cape* is the Italian *cappa,* and this from the Latin *cap-ere,* (*quia hominem capit*). *Escape* is to rush off, divested of your *cape* i.e. your cloak.—Our very English-sounding word *buckram* is Italian. It is properly *bucherame,* and suggests the *interstices* visible in the actual material, being an immediate derivative of *bucherare,* to perforate. The buck-basket in which Falstaff was concealed had its name from a cognate word *bucato,* properly the *lye* used in washing linen, then the linen itself. *Fustian,* another sound of rough English ring, is also Italian, viz., *fustagno,* fabric of Fostât in Egypt. Again: *canvas,* prior to French handling, is *cannavacchio,* from *cannabis* Latin and Greek, hemp.—*Serge,* is Italian *sargia,* late Latin *sarica,* i.e. *serica,* silken. It is implied that the material consists of a mixture of woollen and silk.—In *bawdekin,* an old English word for a rich embroidered stuff used in the manufacture of copes and portable canopies, we have preserved *baldacchino,* properly fabric of Baldacco, i. e. Bagdad. *Baldacchino* now, as tourists know, is the permanent canopy over the principal altar in an Italian church.—Our soft word *velvet* is the Italian *velluto,* derived from Latin *villutus,* suggestive of the *villi,* or hair-like filaments which constitute the surface of velvet.—*Tassel* we take from *tassello,* but we develope from it a sense somewhat of our own. It denotes in Italian a peg (Latin *taxillus*). There is perhaps a reference to the little wooden forms which sometimes constitute the interior of tassels and other ornamental pendants of silk. *Laccia* (from Latin *laqueus* noose) gives us *lace* in shoe-lace &c., and *latchet.* *Galoschia* we make *galosh.* It is properly *Gallica,* a Gallic shoe, a term employed by Cicero. (Phil. 2. 30, 76)—*Traps* and *trappings* (as in horse-trappings) *may* come from *drappe,* Italian *clothes.*—In colours, Italian has helped us to *bay* from *baio,* (whence also *bajoccho,* from the colour of the coin); *brown,* so far as *brown*-study is concerned, from *broncio* morose look; *crimson* and *cramoisie* (from *carmesino,* and this from *kermez,* Arab., the cochineal insect;) *carmine* is from the same root; *lake* [and lacquer] (from *lacca,* Persian, lâk); *maroon* (from *marrone,* the chesnut); *sorrel* (from *sauro* connected with a Teutonic root denoting to dry up or *sear*) ; *yellow* (from *giallo,* i.e., if we do not ourselves also get it from the Teutonic *gelo*). Dyed in *grain* is properly in *scarlet,* from *grana,* Italian, a scarlet berry; late Latin *grana,* L. *granum.* Hence Italian *granata, granate* or *garnet* stone, and Spanish pome-*granate.* *Cornelian* is from Italian *corniola,*—from *cornu,* referring to the nail—as *ὄνυξ, onyx*-stone.

Italian lies hid in several English words which relate to cooking and eating, to viands and condiments. *Kitchen,* to begin with, is the Italian *cucina,* Latin *coquina,* root *coqu-,*cook). The Anglo-Saxon *cycene* was learned from the monasteries. The celebrated *Cokaygne* was properly *Cuccagna,* a Utopia of kitchen-stuff and good things generally. (*Macaroon* and *macaroni* are reported to be connected with *macaria* blessedness.) *To dine* (intermediately, of course, from the French *diner*) is the Italian *desinare,* which has been derived from "Dignare," the first word of a "Grace before Meat."—*Banquet* is *banchetto* and refers strictly to the arrangement of the tables and *benches,* for the guests. The root of the Italian is, however, Teutonic.—*Leccare,* lit. to lick, has produced the French *lécher,* which, through *relécher,* has begot for us *relish. Leccare* itself is again from a Teutonic root.—*Salsa* gives us and the French, *sauce,* which ought to be *sause.* In *sausage* we recover this *s.*—In *mustard* we seem to shew at once our Italian predilection and our etymological knowledge, *mostarda,* the original word, having reference to the *must* or grape-juice with which it appears to have been usual to mix this well-known condiment. As in other instances, the accessory has here usurped the place of the principal notion, which, of course, was not the *must,* but the farina of the *Sinapis nigra* or *alba.*

We have preferred the French *tarte* in tart. The Italian original, viz., *torte,* has more meaning in it, from its allusion to the twisted ornaments often seen about such comestibles. *Torquere* also furnished the root-idea of *to truss,* Italian *torciare.*—In Romeo and Juliet we have (i. 5,) "Good thou, save me a piece of *Marchpane.*" This is the Italian *Marzapane,* which is the late Latin *Marcipanis,* or *panis Martius. Marci panis* might refer to the first maker of the cake so called, as, in English, S. Lunn; or to a distinguished patron of such an article of food, as Abernethy. *Panis Martius,* on the other hand, might be something especially prepared for New Year's Day, *Martius,* March, being originally the first month in the year. Others see in *marza, maza* (whence our maize), derived from *massein* to knead. The thing itself appears to have been a macaroon.—*Fromage* is a French error for *formage,* the Italian *formaggio,* having reference to the *forms* or shapes into which cheese is pressed. Our *artichoke* is the Italian *articiocco,* which in its turn is the Arabic *al-ardi-shauki,* the thistle of the Earth. The Englishman who first suggested *choke* for the foreign, unintelligible termination -ciocco (pron. chiocco) probably had much internal satisfaction.—*Prune* is *brugna,* from *Broniolacum* (*Brignolles*) in Provence, celebrated for its plums. *Dattero,* Italian for *date,* retains more evidently than the latter word does, a vestige of its derivation from *dactylus,* descriptive of the finger-like form of the fruit of the date-palm. In addition to *spice, spezie*—in Italian—signifies all *species* of drugs. The apothecary is a *speziale.*—In this connexion we may venture to give the origin of *treacle,* Italianicè *teriaca.* It is properly an electuary, a specific in cases of bites from venomous beasts (*theres*).

Here are some names of utensils, implements, and appliances for various purposes. *Pitcher* is *bicchiere,* which has given us *beaker* also.—*Flagon* is (1) the old French *flacon*, and this for *flascon*, which is (2) from the Italian *fiasco*, deduced from the Latin *vasculum*. (*Flask* is the same word.) *Adze* is *azza*. *Dagger* is *daga*, both from root *dag* i.e. *dig*. *Mace* is due to the Italian *maccare*, to bruise. *Pommel* is *pomello*, dim. of *pomo*, apple. *Boss* is *bozza*, a rough, unformed block of stone, whence also *botch*. *Billiard* is *biglia*. *Cable* is *cappio*, properly the loop or knot on the rope. *Hawser* hails from *alzare* to hoist, (*altus*). *Buoy* is *boja*, strictly the rope or chain to which the Float is attached. The singular term *cockboat*, with which is connected *coxswain*, is the Italian *cocca*, having the same meaning, derived from *concha* a shell. *Pinnace* in Italian is *pinaccia*, whose root *pinus* poetically signified "a ship." *Forge*, English and French, is *fabrica* the workshop; thus *fabrica*, *fabr'ca*, *faurca*, *forgia*. *Brasier* is *braciere*, from *bra-ce*, hot coals. *Match*, for igniting, is *miccia*, i. e. *myxa* a wick. *Spill*, for the same purpose, is *spillo* (*spinula* from its shape); whence the French *épingle*, pin. *Grate*, *grating*, is *grada*, *gradella*, from the Latin *crates*, *craticola*, whence *grille* in French, and *to grill* in English. *Scaffold* is *catafalco*, from *catar* to view (*captare* sc. *oculis*) and *balco* a stage or gallery. *Gibbet* is *giubetto*, properly *little doublet*, from *al-jubbah*, Arabic, which gives also the French *jupon*. A *mangle* is *mangano*, properly a *ballista* for hurling stones,—from its being worked somewhat as that machine was. *Callipers* or compasses are *calibro*, the bore of a cannon, (Arabic *câlib* pattern); the case in which we put them is *cassa*, i.e. *capsa*. *Model* is *modello*, Latin *modulus*, dim. of *modus*. *Palette* is dim. of *pala* (spade) whence the French *pelle*, and the English *peel*, an implement known to bakers. *Litter*, through the French *litière*, is *lettiare*, late Latin *lectaria*=*lectus*, couch. *Cushion* is *cuscino* from *culcitinum*, dim. of *culcita* Latin (feather-bed). (This *culcita* gives us also *quilt*.) And *culcita puncta* (qu. Marseilles quilt ?), corrupted first by the French into *contre-pointe*, has been finally transformed by us into *counterpane*.

To express military ideas, we borrow *captain*, for example, from *capitano*. *Caput* (*chef*) produces also the old French *chevetaine*, the English *chieftain*. *Champion* is *campione*, one who takes the field (*campus*), in behalf of another. The *Cid Campeador* had his title from the same root-notion. *Scout* is Italian *ascolta*, *scolta*, connected with the Latin *auscultare* to listen, whence the French *écouter* also. A *sapper* is the noun of *zappare* to dig; and this from the Greek *scaptein.* To *mine* (the military sense of this word is the primary one) is the Italian *minare,* whence *mineral. Minare* gave rise rather curiously to *menare* (French *mener*), to conduct or lead, (whence *mien* and *demeanour*). Drovers are wont to work their herds along through the streets and highways chiefly by *threats* (*minæ*).—A *casemate* is the Italian *casa-matta,* of which the origin is disputed, some contending for *casa matta,* a hastily constructed hut; others for the Greek *chasmata. Platoon,* through the French *peloton,* a ball, and figuratively a small detachment of soldiers,—whence *pellet* and even *pelt* —has its rise in the Italian *pilotta,* which is the late Latin *pilotellus,* a dim. of *pila* a *ball. Duel* is *duello;* and like the Italian, by a mistaken reference to *duo,* has acquired the notion of "a combat between two." It is simply *duellum,* the archaic form of *bellum,* as *duis* for *bis. Carbine* is the Italian *carabina,* transformed from *calabrino,* deduced from a late Latin word *cadabula,* conjectured to be the Greek *catabol-e,* a machine for hurling stones. Firearms, in some instances, retained the names of the engines of war in use before the application of gunpowder to military purposes.—*Salet* a helmet, as well as *salade,* the French for the same, is properly the Italian *celata,* which is the Latin *caelata,* sc. *cassis,* i.e. a helmet ornamented with figures in relief. *Alarm* and *alert* are the Italian military cries *all' ar-me* to arms! and *all-er-ta* up! stand erect! (*erigere*). To *escort* is *scorgere,* i.e. the Latin *ex-corrigere* to conduct forth. To *scamper* is the Italian *scampare,* i.e. Latin *ex-campare,* to quit the field. *Tourney* and *tournament* are *torneo* and *torneamento,* and have reference to the equestrian *evolutions* to be seen at such spectacles.—Here *ambassador* may be noticed. We have adopted almost without change the grand Italian *ambasciadore.* This is (first) from the late Latin *ambaxia,* which (secondly) appears to come from the Teutonic word *ambactus* used by Cæsar (deBell. Gal. 6. 15.) for vassal or servant. Webster, in endeavouring to force us to spell it with an *e,* is, as so often, wrong.

In relation to money, we have *finance* itself, Italian *finanza,* that which puts a *finis* to a transaction by paying a stipulated sum. A similar idea is conveyed by *pay.* It is in Italian *pagare,* that is to say, *pacare* to establish peace by the delivery of a sum of money. *Quittance,* even, is derived from *cheto,* which is properly *quieto,* Latin *quietus. Acheter* to buy, in French, is the Italian *acchatare,* which is the Latin *ad captare,* to take to oneself, to appropriate by the payment of a price. To *bargain* is Italian *bargagnare,* for which the late

Latin is *barcaniare,* to traffic in or from a *barca* or *barge,* the boat "quae cuncta navis commercia ad litus portat." To *change,* exchange, is *cambiare, cangiare,* from a Latin verb *cambire* to barter. *Rent* is from *rendere,* in Latin *reddere.* Pittance is *pietanza,* a monk's daily allowance. *Purse* is *borsa,* i.e. *byrsa,* leather. *Budget* has the same signification, being *bolgea* Latinè *bulga,* a word introduced from Gaul. "*Bulgas* Galli sacculas scorteas appellant." Festus.—*Sequin,* generally attributed to *Cyzicus,* may be from the Italian *zecca* a mint, which is the Arabic *sikkah,* a stamp or die. *Piastre* is *piastra,* a thin plate of metal, but derived from *emplastrum* a surgical plaster. *Medal* is the Italian *medaglia,* from the Latin adj. *metallea,* sc. *pecunia,* whence the late Latin *medalia,* half a denarius. *Booth* is said to be *bottega,* one of the odd shapes that *apotheca* has assumed.

Most technical terms in Music introduced into English from the Italian remain unchanged. *Madrigal* is *madriga-le,* from the root *mandra,* a herd of cattle. *Spinet* is *spinetta,* an instrument struck with a *spina,* a plectrum or quill. *Banjo* is *pandora,* Spanish *bandurria,* Latin *pandura,* "a musical instrument of three strings, invented by Pan."

In Architecture, *dome* is the Italian *duomo,* properly speaking the *Domus,* the common Home of the Christian people of a city. The great cathedrals of Italy are generally, in imitation of St. Peter's, surmounted by a cupola. This, seen at a distance, is pointed out as the *duomo.* The whole building is intended; but strangers have chosen to conceive that the reference has been to the cupola only. *Gallery* is *galeria,* an apartment for *gala* days and festivities. *Jalousie,* for Venetian blind, behind which one may see and not be seen, is *gelosia* for *zelosia.* *Vault* is *volta,* i.e., *camera voluta,* from the arched roof. *Chimney* is *caminata;* properly *camera caminata,* a room provided with a *caminus* or fireplace. *Gaol* or *jail* is a softened form of *gabbiuola* a diminutive of *gabbia* or *gaggia,* i.e. the Latin *cavea;* whence also *cage.*

> "Velut ursus
> Objectos *caveae* valuit si frangere clathros,
> Indoctum doctumque fugat recitator acerbus."
> Hor., A. P., 472-4.

Cajole is cognate. *Grotesque* is *grottesco,* ornamentation after the style of that to be seen in the catacombs or *grottos.*

A variety of miscellaneous instances of disguised Italian in English might be noticed. E. g. *To re-member,* Italian *membrare* from the Latin *memorare.* To *commence,* Italian *cominciare,* late Latin *cominitiare.* To *defy,* Italian *disfidare,* properly to disclaim, to renounce confidence in (*fides*). To *search,* Italian *cercare,* Latin *circare,* to look *about* for (*circum*). To *baffle,* through the French *beffler,* Italian *beffare,* to jeer, over-reach. To *inure,* from Italian *uria*; contraction of *auguria,* whence, by misapprehension, *heur* also, in French, in the words *bonheur, malheur.* To *impeach,* Italian *impacciare,* to hinder, arrest, implicate, a strengthened form of the Latin *impingere.* (*Dispatch,* Italian *despacciare,* is the opposite term.) To *plunge* (through the French *plonger*), Italian *plombare,* Latin *plumbicare,* to go down like *lead.* To *launch,* Italian, *lanciare,* to hurl. (Hence the well-known *élan* in French—for a "spring-forward" or "dash.")

To *repose,* Italian *riposare,* i.e. *repausare* late Latin, as on an inscription *Pausat in pace.* To *muse,* and *amuse,* (the latter sometimes assigned to *à musis* "away from study",) Italian *musare* to stand *a-gape;* (to *a-muse* is to set *a-gape*), from *muso* (Lat. *morsus*), the muzzle or mouth. To *caulk* (a ship, &c.), Italian *calafatare,* corrupted from the Latin *calefectare,* the reference probably being to the *hot* melted pitch used in paying the seams. To *calk* (a horse, &c.), connected with Italian, *calcare* to press with the foot (*calx*). To *anneal,* Italian *niellare,* literally to *make black* (*nigellus*). *Coy,* through the old French *coit,* is the Italian *cheto,* which we have already seen to be *quieto.* (From *coit* comes *coiser,* whence we have *cosy,* i.e. *coisé.*) *Quaint* is *conto,* contracted for *cognito,* known, familiar, homely. *Acquaint-ance* involves the same word. *Entire* is *intero,* Italian for *integro.* A *jewel* is the Italian *giojello,* derived from *gaudium,* a joy or delight. *A fair,* a special time for trading, is *fiera,* which is the Latin *feria,* the *feriae* or festivals determining the times of the *fairs. Curate* is *curato. Parrot* is *parrocchetto,* i.e. "little priest," being the diminutive of *parochus,* the curé of the *parish.* This bird was a favorite pet of the solitary ecclesiastic of the olden time. *Juggler* is *giocolaro,* Latin *jocularius. Usher* is *usciere,* Lat. *ostiarius* (doorkeeper). *Fetish* is *fattizio,* a *factitious* object of veneration. A *jay* is *gaio* from the gaiety of its colours. A *clove* has its name from *chiovo,* which in Italian is a *nail,* Latinè *clavus.* The whole expression is *chiovo di girofano,* i.e. *clavus caryophylli. Curtain* is *cortina* from *chors* an enclosure, a place curtained off. *Plot,* in such a compound as *grass-plot,* is the Italian *piota,* sward pleasant to the *foot* of man and beast. *Piota,* in modern Italian, denotes only the foot of a beast. In very ancient Italian, in Umbrian, for example, *plotus,* i.e. *plautus,* "flat-footed" was applied to man.

(*To be continued.*)

REVIEWS.

Lectures on the Elements of Comparative Anatomy. By Thomas Henry Huxley, F.R.S., Professor of Natural History, Royal School of Mines, and Professor of Comparative Anatomy and Physiology to the Royal College of Surgeons of England. *On the Classification of Animals, and on the Vertebrate skull.* London: John Churchill & Sons, New Burlington Street. 1864.

We have no intention either of analysing or criticising at length this important work, which we could not be satisfied without bringing under the notice of such of our readers as are interested in physiological or natural history pursuits. The name of Thomas Henry Huxley assures us of sound knowledge, original research, profound thought, complete command of the literature of the subject, foreign as well as British, and a clear, lively, straightforward style in the communication of his ideas. No work of his can fail to be deserving of attention, and he has here entered on a very wide and most interesting field, of his labours upon which the volume before us affords but a preliminary specimen. We are far from admitting the correctness of all his arguments or from receiving all his conclusions, and it would take much more time and space than we can command to discuss to any purpose what may be called in question. But when we most differ from him we appreciate his high qualities and strongly recommend to every inquirer the study of the work now before us, as well as of his other contributions to science.

It is, perhaps, hardly with strict propriety that Professor Huxley's work, consisting of lectures delivered before an audience as learned in this department as could be assembled, and specially treating the most doubtful and disputed questions which the science affords, is entitled, "*Elements* of Comparative Anatomy." The work is as far from giving the introductory views and general statements expected in an elementary work, and adapted for beginners, as it is from being an arranged statement of full details on the various branches of the proposed subject. It seems rather to be a collection of treatises on obscure or much disputed points of the science in which the author examines the different opinions maintained, and endeavours controversially to establish his own views. We by no means object to the plan pursued. We feel sure that the advanced student of comparative anatomy and physiology will read the lectures with deep interest and great profit, but if the title should lead any one to expect an elementary treatise, it must occasion disappointment.

Professor Huxley's general doctrine of classification is not one from which we could anticipate the best results. He is disposed to favour *a* classification—one among many possible ones, instead of seeking *the* classification which truly expresses the relations really existing among the several parts of the animal kingdom; and relying for his purpose on a few definite characters, he expects every included object exactly to conform to a precise definition, whilst we believe that every truly natural assemblage of objects is marked by a group of characters all of them manifest in the more typical forms but in deviative examples gradually fading out, so that one fails here another there, though on the whole the object must be referred to that and no other division. We cannot recognise strongly marked dividing lines as occurring in nature, and we are persuaded that exacting strict conformity to a precise structural definition must of necessity make any principle of classification worthless for its best purposes. In the important portion of his work which relates to the vertebrate skull, we find Professor Huxley opposing himself to the theory, now very generally received of the vertebrate composition of the skull. This theory in itself antecedently probable, and supported by facts which he himself sufficiently states, seems to us to have fallen into disfavour with our author, because it has been ably supported and illustrated by Professor Owen. The malignity, for we can use no milder term, manifested in these lectures, as elsewhere, against this profound comparative anatomist and great naturalist, is the most objectionable feature of Professor Huxley's work. It is lamentable to see such men as these carrying personal enmity to such extremes. It calls for the grave censure of such as feel that the study of nature ought to lead to harmony and friendly feeling amongst all its votaries, and that if the pursuit of truth necessarily produces alienation of feeling and bitterness of condemnation, the gem is hardly worth the cost at which it must be obtained. W. H.

Observations on the Terrestrial Pulmonifera of Maine, including a Catalogue of all the species of terrestrial and fluviatile Mollusca known to inhabit the State. By Edward S. Morse. Portland, 1864.

This little work, though separately offered for sale, is an article extracted from the Journal of the Portland Society of Natural History for March, 1864. It is at the same time a useful contribution to local natural history, and contains valuable structural observations relating especially to the buccal plate and the lingual membrane, illustrated by many well executed figures, rendering it exceedingly interesting and useful to every student of the land and fresh water Mollusca. How far the author is right in considering the differences in the figure and markings of the buccal plate, and in the comparative number of plates in a row on the lingual ribbon as generic and family characters, we shall not now attempt to determine, nor have we formed a distinct opinion on the subject; but there can be no question that such characters have great value in their proper place, and that the observation of them increases our knowledge of the animals and our interest in studying them. If some of these variations were to be ultimately regarded as only affording sectional characters within a natural genus, and as demanding less multiplicity of names, they would still lose none of their interest with the careful student, and such a statement and illustration of them as is given in this work of Professor Morse must be deservedly held in very high estimation. We shall look with much interest for his promised paper on the classification of the Pulmonifera, in which he will give his reasons for the arrangement he has adopted. One thing is obvious—that the necessity for very numerous names greatly increases the risk of the introduction of barbarous or improperly constructed ones, and of the use of the same names in different branches of natural science, an abuse not to be endured; and it becomes all original investigators who may have to select names to be very cautious lest they should burden science with names which cannot be retained. We do not at this moment recollect whether the name Isthmia was first given to a genus of Diatomaceæ or to the section of Pulmonifera to which our author applies it, but most clearly it cannot stand in both situations, and we believe the Diatomaceous genus is the one to be received. The work before us is too much occupied with specific details to afford matter for quotation, but the following passage will interest all who are engaged in studying Pulmoniferous Mollusca, and will give a good idea of the author's mode of viewing the subject:

"In the Helicidæ, (as restricted here to those animals which sustain a globose or planospiral shell) we have noticed thus far three principal types of lingual dentition.

"(1.) In those larger forms of Helices which we include under the sub-family Helicinæ, we have in the lingual membrane about one hundred rows of plates, with about seventy-five plates in a row. The laterals and uncini are scarcely distinguishable one from the other; in fact they may be said to blend together. The centrals and laterals are unidentate and similar in form; the uncini either unidentate, bidentate, or irregularly notched. The buccal plate is solid, arcuate, its frontal portion strongly marked with longitudinal ribs which crenulate the cutting edge.

"(2.) In another group which we designate as Helicellinæ, we have the viscera protected by a thin, glabrous shell; the lingual membrane is nearly as broad as long, having about sixty-eight rows of plates, averaging about forty-two plates in a row; the laterals and uncini are quite distinct; the central plate broad, long, tridentate; the laterals, three to five, bidentate, identical with central, in form of denticles; the uncini unidentate, the denticle being aculeate and re-curved. The buccal plate is thin and crescent shaped, with a middle beak-like projection, lateral terminations pointed.

"(3.) In a still smaller group, for which we propose the sub-family name of Valloninæ, we have the lingual membrane composed of eighty or ninety rows or plates, averaging twenty-six plates in a row. The laterals and uncini are generally distinct. The central plate is square, tridentate; the laterals four to five, square, bidentate; uncini broad, short, and minutely serrated. The buccal plate is slightly arcuate, rarely produced centrally; its front surface marked with delicate perpendicular or diverging striæ, faintly notching the cutting edge; the lateral terminations of plate being rounded or blunt.

"These three types of lingual dentition are accompanied with like peculiarities in the character of the shell, the external appearance of the animal, and the general size of the species.

"Vitrininæ I restrict to Vitrina, owing to the value I place on the external characters of the animal. Punctinæ I hold good on the extraordinary character of the lingual dentition and buccal plate peculiar to the species on which this sub-family is based. The other groups we have not considered sufficiently to offer any opinions as to their relative value or position. Taking the number of plates in a row from five different species in each group from Pupinæ upward, and averaging this number for each group, we have the following result:

Limacidæ including Philomycenidæ,	94
Helicinæ,	73
Helicellinæ,	42
Valloninæ,	26
Pupinæ,	24

THE LATE PROFESSOR BOOLE.

The scientific world deplores the, to our narrow view, premature loss of one whose genius, acquirements and character caused him to be held in the highest estimation: Professor George Boole, of Queen's College, Cork. We copy from a local paper a tribute to his memory which many will peruse with a melancholy interest:—

"The intelligence of the death of Dr. Boole, Professor of Mathematics at the Queen's College, Cork, which it is our melancholy duty to announce, will be received with regret not alone by his friends and acquaintances, but in all the learned bodies of Europe. His vast genius and profound and versatile acquirements extended his fame beyond the limits of these islands, and made his name "familiar as a household word" in all the great scientific assemblies of the Continent. The extensive renown which the name of the deceased obtained, was the result entirely of his vast natural ability and devoted application to scientific studies. He was self-taught in the proper sense of the term. Living secluded in Lincoln where he was born, avoiding the pleasures of society, and disregarding the allurements which often prevent the cultivation of genius, the solitary student occupied his time in elaborate researches into the hidden laws of natnre, which he only varied by occasional lonely rambles amongst the verdant hedgerows, where his enquiries into her inner mysteries were exchanged only for reflections on the beauty of her external manifestations. He never studied under a tutor, and the enormous mass of profound and accurate information with which his mind was stored, as well as the high degree of cultivation which his intellect exhibited, were the result of his own private and unaided application. Although he attained so lofty a rank amongst the great mathematicians of the age, he did not confine himself to the study of mathematics alone. He was so well read in classics that he was better qualified for a professorship in them than many who have devoted their attention exclusively to the ancient languages of Greece and Rome. He was also well acquainted with modern European languages, and was lately engaged in translating some mathematical works from the German. His rare ability was first perceived upon his communicating to the Royal Society, when only 22 years of age, a mathematical paper in which he carried his investigations on portions of the differential calculus to such length, and with such astonishing analytical powers, as to merit the society's gold medal. The subsequent years of his life were passed in the same manner, and he continued to prosecute his studies with the most devoted ardour, "far from the bustling haunts of men." The University of Dublin presented him with the degree of Doctor of Laws. The University of Oxford in similar recognition of his acquirements and ability, conferred on him the degree of Doctor of Civil Law. He was elected a Fellow of the Royal Society of England, and the French Academy of Science honoured him by putting his name on their roll, with the intention of electing him one of the few foreigners who are corresponding members of that learned and select body. The recent demise of Struve, the great Russian mathematician, created a vacancy in that august conclave which Dr. Boole was to fill; but this unexpected death deprives him of the enjoyment of that distinction. On his appointment to the professorship of mathematics in the Queen's College here, it was freely acknowledged by the most competent authorities that the government had sent us the ablest scholar in the kingdom, and that in the Universities of Oxford, Cambridge or Dublin, an equal to George Boole could not be found. He was the inventor of a very ingenious system of mathematical notation, and in addition to his "Outlines of the Laws of Thought," and "treatise on differential equations," was late engaged in the preparation of another work on Mathematical Science. Although the deceased was of a very retiring disposition and avoided company, his genial good nature and warm-hearted generosity, as well as his high moral principle, made him esteemed and beloved by all who had an opportunity of forming even the most casual acquaintance with him. In proof of this we need only mention, that when a special meeting of our Local Gas Company was called to give the shareholders the benefit of ten instead of eight per cent. Professor Boole, at much inconvenience, attended, and spoke earnestly against the proposed breach of faith. Although he was then only one of five dissentients, he has had the satisfaction of seeing recognised and established the principle of justice which he then advocated to his own pecuniary disadvantage. He devoted himself with zeal to the instruction of the students attending his lectures, and from his lucid manner, was most successful in conveying to their minds clear and distinct ideas of the intricate considerations which the subjects involved. His regard for the students did not terminate with their attendance in his lecture room, for his warm-hearted benevolence made him take an interest in their subsequent career. He was guileless and simple as a child, tender and affectionate as a woman, and in the full sense of the expression, an honest man. Those who enjoyed the rare opportunity of studying the higher mathematics under his guidance, feel that they have suffered an irreparable loss, and that so lofty and at the same time so gentle a mind is rarely met with."

THEODORE II. AND THE NEW EMPIRE OF ABYSSINIA.

THE YOUTH AND ACCESSION OF THEODORE.

(*Translated from the Revue des deux Mondes, Nov.*, 1864.)

I.

Since the adventurous journey of Bruce, more precise notions have replaced, among us, the old world fables which made of the empire of the Négus* something as unknown and mysterious as the District of Monomatapa. This result, is due, chiefly, to certain narratives, in books welcomed with generally deserved favour in France, England, and Germany. This movement towards publicity, however, has been arrested during the last twelve or fifteen years, a thing much to be regretted, since it is precisely within that period that Abyssinia has made its first serious effort at political and social reorganization. So much the less should this attempt be allowed to pass unnoticed, as it is, perhaps, the only endeavour of its kind, attempted by a declining people in taking as a model, not European modern civilization, but that which it formerly possessed. Whatever may be the final issue of this bold experiment, it will not, perhaps, be uninteresting to become acquainted with its phases and, above all, to study the strange man who presides over it, and whose name has for two years begun to be familiar to us.

The traveller who coasts along the African shore of the Red Sea, and who, since leaving Suez, has had nothing before his eyes but downs and little dun hills, unconnected and monotonous, on approaching the coral islet of Massaona, sees, defined against the horizon, a long and lofty wall, over which, as sentinels, tower three or four peaks, ordinarily hidden in the clouds. This is the most advanced slope of an immense table land, two hundred leagues in breadth by a length still undetermined; and this plateau, rising to an average height of 8000 feet above the level of the sea, is the whole of Abyssinia. Never have the boundaries of a state been defined by nature with a more inflexible hand. The plateau, which possesses the mean temperature of central Europe, and where hardly a twentieth part of the soil remains uncultivated, is composed of arable lands rivalling in fertility those of Flanders and the Ukraine, watered by two great rivers and two hundred rivulets or permanent streams which, skilfully economized, everywhere sustain vegetation and life. At the foot of the mountains, a yellow, bare, stony and undulating plain, covered with gum trees and other thorny shrubs, extends to the sea, its sands and dry beds of torrents, where some thousands of nomads seek for scanty pasture and waters, not unfrequently brackish. The burning air breathed in these regions is fatal to the Abyssinians, who there meet the dreaded nefas, the deadly fever of the low-lying grounds: on this account, they do not appear, for ages, to have made any lasting establishment upon it. It is true that the same physical cause which forbids their conquest of Soudon has always been their protection against their Mahommedan neighbours of the Nile or the Red Sea.

---

* This word of the Amharic language, which may be translated *King of Kings*, is principally employed to designate the sovereign of Abyssinia.

The Abyssinian race is not more African than the country it inhabits. In features, mind, qualities, and defects, and, above all, in perfectibility, this people is allied to the Caucasian race, and that, unquestionably, closer than the Hindoos or the Persians. In this relationshship lies a series of mysteries, which I content myself with pointing out to the true lovers of ethnological problems. All else is obscure in the origin of this nation, which religious prejudices have led to give itself a Hebrew derivation, that critical history does not accept. The first home of indigenous civilization was Axum in the province of Tigre, a name extended by degrees to all Abyssinia east of the river Takazze. The establishment of Christianity, of communication with the Greeks of Alexandria, and even with the Roman empire itself, the conquest of Arabia Felix, all date from this brilliant period of the Axumite kings, still powerful at the time of the Crusades. The removal of the capital to Gondar, a little later, marked the decline of the Tigrëens and the supremacy assumed by the Amharas, a strong, hardy, and warlike race who appear to have come from the south, in the region about the equator, and who assimilated to themselves the religion, manners, civilization, and, to a certain extent, the language of the subjugated people. At the present time, the recollections of this conquest are, happily, effaced—thanks to the necessity in which the Abyssinian people found themselves of vigorous concentration, in order to resist the great Mahommedan states which attacked their country upon the east and west, and the hordes of heathen and savage Gallas who overspread it upon the south.

Abyssinnia is divided into thirty provinces, generally having, in official documents, the pompous title of kingdoms, a title that facts ceased to justify fifteen centuries ago. Those most frequently mentioned in books and the narratives of travellers are, commencing at the Red Sea, Hamazene, Agame and Chire, fine, fruitful districts, inhabited by an industrious and peaceful population; Semen, which the Germans call the Alps of Africa, and which merits this name by its snowy summits over 16,000 feet high; Dembea, a rich and populous plain, washed by a beautiful lake, two hundred miles in circumference, and in which geology discovers an immense volcanic crater; Beghemder, Godjam, Damot and Choa, fertile and smiling regions, where provincial rivalries maintain a perpetual flame of civil war; finally Lasta and Koura, mountainous and picturesque countries, peopled by a poor and proud peasantry whom sceptical good sense has preserved from the fruitless agitations of their neighbours. All these form a whole of about 4,500,000 inhabitants scattered through nearly 6000 villages.

The normal government is an hereditary monarchy, restricted by a feudal oligarchy which in turn finds itself limited by the strong and liberal organization which the commons enjoy, thanks to their numerous country gentlemen (*balagoult*, feudaries). It is in every respect the political mechanism of Hungary and Poland down to a very recent period, and of Russia till the time of the Czar Boris the first, who established serfdom. Abyssinia has never had a middle class. The merchants (neggadé) form a class knowing no other bond of union than that of commerce, isolating themselves from public affairs, and inhabiting a small number of towns such as Gondar, a broken down place of 10,000 souls, at most, and the centre of learning and theology; Adona, its rival, a modern and commercial city, the capital of Tigre and five leagues from Axum, which is no more than a vast monastery; Koarata, a charming little town standing upon a projecting point of Lake Tana; Ankober, Madhera-Mariam, Derita, and Emfras, each with a population of hardly 4000 souls. We may also mention, by way of curiosity, the town of Azazo near Gondar, built round a famous monastery, and inhabited by an aristocracy of literate merchants who divide their attention, equally between business and theology. As to the clergy in Abyssinia, it does not form a distinct political body. The constitution, which grants it great immunities within the church, outside of its pale, places it on a level with the meanest citizens. Its members are moral, studious, and comparatively honourable, whatever Bruce and others may have said to the contrary. Neither does the army form a separate class or permanent force: every *balegoult* owes military service in proportion to the importance of his fief and for a fixed time, as was the case with our feudatories of the middle ages. There is, nevertheless, in the Empire of the *Negus* a floating population of from 60 to 80,000 men who make a trade of war; but this body has no more influence upon general politics than formerly the lansquenets and free lances had among us. It may therefore be said definitely, that the ruling class in Abyssinia, during orderly times, is the rural population, represented by more than 80,000 country gentlemen, and, during revolutionary periods, by the confederate aristocracy which seizes upon the power by a bold stroke nearly always ephemeral.

French travellers who have visited Abyssinia, during the last thirty years, from Messrs. Combes and Tamisier down to the Messrs. d'Abbadie, have seen it, after convulsions which have occupied a century, arrive at a condition, identical, in more than one respect, to that from which France emerged eleven hundred years ago, by the powerful hand of the Carlovingian kings. A dynasty of princes without power, surrounded with mock homage, and tossed about by all the caprices of a half-feudal, half-pretorian oligarchy: civil war in permanent possession; the church alone standing, yet already invaded by barbarism and the spirit of violence; are what in France succeeded to the sons of Clovis, and in Abyssinia to the Davids, the Claudiuses, and the Fasilides. The annals of ancient Abyssinia have often occupied the attention of travellers and historians; but they have always neglected to study the more intimate history of this monarchy, grafted upon an ancient civilization that to us now seems barbarous. Half-Cæsars and half-pontiffs, their crown adorned with a triple row of diamonds and surmounted by a mitre bearing a cross, the old *Negus* lived under tents, without any fixed residence, and conseqnently without any fixed capital, surrounded by an army ever ready to maintain the integrity of too vast an empire. The name of Prester-John, given to the *Negus*, by the first Europeans who saw them during the Crusades, well expresses the strange, half-fabulous character which, more than once, exercised the imaginations of our forefathers. The emperor, who three centuries ago first substituted for this kind of knight errantry a clumsy imitation of the Western Kingdoms, unconsciously prepared the way for the degeneracy of his race, and for the disaffection of a people delighting in war. The imperial family, however, might still have preserved, for a long time, its prestige, founded upon the national and religious traditions of the country, if one of the last *Negus* had not conceived the fatal idea of surrounding himself with foreign mercenaries, whom the great vassals, uniting, expelled after a sanguinary struggle. In this contest, the feudal lords learned to appreciate their power. Their most daring chief, the *ras* Mikael, whose dramatic story Bruce has given in detail, did not shrink from regicide. This crime, soon avenged by a coalition of his rivals who deprived him of power and liberty, served, however, as a lesson to his conquerors, who employed no other tactics than that of isolating the sovereign from the nation, dooming him to a life of idleness divided between pleasure and frivolous studies. They succeeded thus, in two or three generations, in creating a line of phantom kings who still exist, adored by the clergy, despised by the nobility, and scorned by the warlike chiefs who seize upon the power, not even doing them the honour to consider them dangerous. A traveller who passed through Gondar, twenty-five years ago, found the legitimate emperor of Abyssinia reduced to the manufacture of pelisses, in order to live. Another European since then, crossing one of the ruined suburbs, lying alongside the deserted palace of the *Negus,* met a young lad about twelve years old, poorly clad, but proud even in his poverty. He asked him his name. "My baptismal name, replied the child, "is Ouelda-Salassie (son of the Trinity); I am *Negus nagast* (King of kings). He, also, was a scion of this dynasty of lawful Abyssinian princes, long since stricken with irremedial moral decline.

Two or three men have attempted of late to reconstitute the power invested in a single ruler, which can alone save the unfortunate Abyssinian people. About 1830, there arose, in the Eastern provinces, a certain Sabhogadis who became, in reality, king of Tigre, and in whom was realized the type of such a perfect prince as the native mind loves and understands, being brave, pious, liberal, and improvident. When a savage confederacy overwhelmed him at the battle of Mai-Islamai, in February, 1831, his heroic death was the occasion of general lamentation. "Ah!" says a still popular song, "will they be blessed who have eaten corn watered by such blood?" In the struggles which followed the death of Sabhogadis, the violent gave way, little by little, to the skilful, and, remarkable among the latter became the famous Oubie, long known in Europe from the narratives of travellers whom, while bearing towards them the deepest hatred, he exerted himself to please and entertain. The life of Oubie is an unconnected romance, commencing from his very birth. He was the child of a caprice of *dedjas* Hailo,* a young prince whom a rainstorm had surprised while hunting, and obliged to pass some hours in the house of a beautiful widow of Djanamora. The family of dedjas Hailo bore a close resemblance to that of Richard, Cœur de Lion, in which "fate condemned the fathers to hate their sons, and the sons, their fathers." The bastard Oubie, disowned by his father, at the death of that parent, succeeded in ejecting his brothers, scattered his uncles, and either fought in detail or brought into cleverly laid ambush, the brilliant and rash native feudal lords. About 1840, he exercised actual royal authority, from the environs of Massaona to the gates of Gondar. Two men, alone, stood out against him, *ras* or high constable Ali, master of Gondar and the central provinces, and *dedjas* Gocho, a great baron, almost unassailable among the mountains of Godjam. Oubie had a manifest superiority over these two men. He had an object, that of replacing the degenerate dynasty, lingering in the great deserted halls of the palace of Gondar, and of restoring the line of warlike and conquering *Negus*, who, for three centuries past, had been but an ironical memorial to the present. As a formality indispensable to his coronation, he had made sure of the interested concurrence of the *abouna* or head of the national church, and, strong in this support, he went to give battle to *ras* Ali before his own residence of Deora Tabor.

This battle, fought in 1841, might pass for a comedy had not human blood flowed in it. The ras, seeing his cavalry routed at the very first charge, galloped away, and was only discovered a fortnight later, hidden in a monastery among the mountains of Lasta. Three of his generals, thinking all was lost, went to the tent of Oubie in order to give up their arms. They found him in a senseless state of intoxication, and taking advantage of his condition, bound him and carried him off, along with the *abouna*. Ras Ali, to whom the bold stroke of the three generals had thus restored the victory, exhibited, upon this occasion, the indolent generosity which characterized him. Preferring to deal with a vassal, who promised gratitude and fidelity, to fighting, successively, the great barons who, at the point of the lance were disputing for the states of Oubie, he restored to the latter his liberty, of which he made a use easily foreseen. After having divided, deceived, and beaten the barons in succession, the bastard, stronger than ever, re-opened the campaign against ras Ali (1847). This campaign was confined to a series of marches among the Alps of Semen, in the midst of severe cold, which contributed much towards rendering it inoffensive; it was only marked by skirmishes of secondary interest, in which appeared with distinction a young leader of a band called Kassa, the heir of a great name, but in whom the two parties were far from detecting the man destined to restore the Ethiopian empire upon the bloody ruins of feudalism.

---

* The titles of *dedjas* (duke), *ras* (high constable), are placed, without an article, before the name of the person, as in the case of the English *lord*, and the Spanish *don*.

Kassa Kuaranya, now Theodore the second, was born, about 1818, at Cherghie, chief town of the mountainous province of Kuara, governed by his father and uncle, the *dedjaz* Haïlo Mariam and Konfon. Haïlo Mariam was of noble origin; as to the mother of Kassa, a very doubtful rumour, accredited by the vanity of her son, since his accession to the throne, would make her descend from the legitimate imperial family, that which native history connects with Solomon through Menilek, son of the beautiful Makada, queen of Saba. History has preserved no particulars of Haïlo Mariam; Konfon, on the contrary, was the most distinguished chief of the western frontier of Abyssinia, open to Egyptian incursions. It was he who deprived the Musselmans of the province of Gallabat, and, in 1838, cut to pieces, at the battle of Abon-Qualambo, the Egyptian regulars of Mahomet-Ali. The native poets have celebrated this battle in a song, commencing thus:—

> "The sabre of Konfon was black, and behold it has taken the colour of the (red) caps of the Turks..."

Also, when Konfou died, his sister composed a requiem, still popular in the whole of Abyssinia:—

> "*Ye tallako amora kenfou*[*] *tessabara*.....
> Broken are the wings of the great eagle,
> That swept from Metamma to Sennaar..."

---

[*] There is here a pun upon *Kenfou* (wings) and *Konfou*, the name of the hero. Arab taste is in this respect, transmitted to the Abyssinian.

The death of Haïlo-Mariam followed close upon that of Konfou. Greedy kinsmen seized upon his estate; his widow, plundered and unaided found herself reduced, to sell *kousso,* a medicinal plant, in the streets of Gondar; and young Kassa was sent to the monastery of Schanker, near Lake Tana, with the prospect of one day becoming one of the too numerous learned men or *debteras* of Abyssinia. This asylum, however, was not destined to be thus fatal to him: *dedjas* Maro, one of the great vassals, who disputed for the empire, fell upon the monastery of Schanker, after a defeat, deluged it with blood and, thus cowardly, revenged himself upon the children for the humiliation to which their father had subjected him. Kassa escaped the massacre, and, favoured by night, took refuge in the family of his uncle.

The three sons of Konfou, at their father's death, knew no better than to dispute with their lances, the right of inheritance, until the arrival of the powerful dedjas Gocho, prince of Godjam, set them at one again, by conquering the province on his own account. Kassa, who had taken the side of the eldest of Konfou's sons, took refuge in the mild and secluded district of Sarago, in the house of a peasant, whose hospitality he shared for more than a month. Upon leaving his retreat, we find him at the head of a handful of highwaymen, stopping the road from Gallabut, in company with another bandit. He already showed himself superior to the vulgar adventurers among whom he lived, and an attempt that he made to establish a certain discipline among them, gave rise to a conspiracy that young Kassa, being apprized of, by the faithful among them, repressed with severity.

Tired of this existence, unworthy of him, and, strengthened by the junction of some of those bands with which civil war had filled Abyssinia, Kassa set his mind, thenceforward, upon making a political position for himself; and resolved to dispute with Menene, the mother of the ras Ali before-mentioned the province of Dembea. Menene is a remarkable figure in the contemporaay history of Africa. The daughter of a great Mahommedan lord of the Galla country, she had married the reigning *Negus* for ambition; and had not been more faithful to him than are the great Abyssinian ladies in general. She commanded her troops in person, governed her fief of Dembea with vigour, and was not very unpopular, since, though haughty enough, she was not cruel. What seems to have troubled her most, was the thought that she and her son ras Ali were only upstarts in the midst of a royalist, ceremonial, and christian Abyssinia. She willingly surrounded herself with priests and scholars, and ras Ali founded and endowed many churches; but their orthodoxy was hardly credited—a fact which contributed greatly to their downfall. Being notified of the designs of the son of Haïlo, Menene sent against Kassa, at first, but a small army which gave way at the first shock. Menene, then taken at unawares, found she could not do better than offer the conqueror the province of Dembea under her sovereignty, and the hand of her grand-daughter, Tzootsedje. Kassa made no hesitation about accepting both offers.

He was then young, adventurous, and fanatical. Thus he only followed his natural inclination in undertaking a campaign against the Egyptians, who, favoured by the troubles of Kuara, had re-conquered Gallabut. He made his first raid against the capital of the latter province, the town of Metamma, where was held a weekly market very generally resorted to: he attacked the place on the market day, and departed laden with booty. This successful achievement brought about him every young vagabond in Gondar that could hold a lance and shield, and, followed by this motley crowd, more embarrassing than useful, he fell in, on the banks of the river Rahad, with two companies of good Egyptian infantry, strongly intrenched in a *zerilsa* or enclosure of thorns, and commanded by a certain Saleh Bey, a fat, inefficient officer, who had the good sense to conceal himself behind a simple captain named Elias-Effendi, an experienced and modest man who saved everything. The Abyssinians came on like a whirlwind; but, stopped short by the hedge, they had to make a halt and attempt to remove the thorns while the fire of the Egyptians swept them away at close quarters. To these volleys was added the discharge of two field pieces, so much the more dreaded by the Abyssinians on account of their want of acquaintance with cannon. Their firmness, however, under this regular and murderous discharge, and their battle-cries, made the Turkish soldiers waver; and they would most certainly have given way without the example of their officers. Kassa, from his open tent, was a spectator of this butchery, when a Turkish bullet broke the shoulder of one of his relatives, and cut the stake of his tent which fell upon him. He immediately put a stop to the useless massacre, and retired, leaving hundreds of dead upon the spot, and the enemy astounded at the savage valour of his soldiers. "They came to the cannon's mouth," said Saleh-Bey to me, some time afterwards, "like mosquitoes to a candle."

Humiliated and wounded himself with a bullet, Kassa, in some hours, made a march of fifty miles, and met upon the frontier an Italian lazarist, Father Biancheri in quest of proselytes. In the disordered state of his mind, he asked him point blank: "Are you the friend or the enemy of our father the *Abouna?*" "I am the friend of all christians;" replied the priest evasively. Kassa then informed him of his disaster, and said to him: "These Turks are not braver than we; but they have the discipline of the Franks. You are a Frank: will you teach my men?" "I am not a soldier;" replied M. Biancheri, with embarrassment; "I am only a poor wanderer for Jesus Christ." And thereupon they parted.

In his retreat, Kassa caused to be brought to him one of the *azmari* or jugglers, who practise medicine in Abyssinia, in order to extract the ball lodged in his wound. The *azmari* refused to take the matter in hand till he received a fat cow and a *gombo* of mead. The wounded man, destitute for the time of everything, sent to Menene for these. But the vindictive princess, delighted with the misfortune of her former conqueror, and profiting by it, only sent him a quarter of beef, adding that a whole cow was too fine a present for a man like him. Kassa dissimulated his rage; but hardly was recovered of his wound than, mounting his horse, and followed by his faithful soldiers, he took the road to Gondar, resolved to chastise Menene. The troops of the sovereign who tried to stop him at Tchako, were thoroughly beaten, and, among the prisoners, was found dedjas Oundesad, an arrogant chief who had promised to bring to Menene the son of the *kousso*-vender, living or dead.

The chief prisoners were invited to the banquet which was given, according to custom, after the battle. Among them was Ounderad who felt far from sure as to the results of the festivities, when he found himself placed at a bare table, and had put into his hand a *berrille* or Abyssinian flagon of antique form, filled with a black looking liquid, while the officers of Kassa ate with savage gusto, and drained mirth from flasks of excellent mead. Kassa, who presided over the banquet, turned towards the conquered, and said to them with courtesy: "My friends, I am, as you have said, only the son of a poor vender of *kousso*; and this reminds me that my mother has sold nothing to-day. I have thought you would not refuse me when

I ask you to do honour to her wares; and, if it be not very appetizing, accept my excuses therefor." And he forced tnem, trembling and happy to get off so easily, to drink, to the dregs, flagons of this abominable purgative.

This was followed by a new engagement, in which Menene fought in person, and, wounded by a lance-thrust, fell into the power of Kassa. Ras Ali then besieged, in the heart of winter, the mountain which served for a stronghold to Oubie; he left the siege, and came in person to ask from the young conqueror the peace that he had refused to Menene, and to the solicitations of Amara Konfou, one of the shrewdest diplomatists of the country. Kassa consented to treat, kept Gondar, released Menene, and, according to national usage, gave his own mother as a guarantee of good faith. Kassa was then in the condition of a half-rebel, which he could only maintain by force of audacity. In his position of ras and master of the capital, the young chief did not fear to exact tribute from the powerful prince Gocho, dedjas, and, almost, king of all the country surrounded by the river Alsai in its vast upper curve. Gocho, brave, liberal, and a friend of Europeans, was the truest type of the *mokonnen,* or Abyssinian nobleman; and, consequently, without more mind and foresight than his fellows. Surprised and exasperated at this insolence, he collected a good army, obtained from Ras Ali the investiture of the conquests he was about to make, arrived upon the Dembea, and succeeded in sweeping away the little army of Kassa who took refuge in the low grounds (*kolla*) of his native province where he lived, for a year, upon roots and wild fruits, while the conqueror installed himself in Gondar (1852). What most affected Kassa was, that Gocho had found and plundered the pits which he had filled with his favourite provisions, the *chimbera,* or Abyssinia pea. However, in October of the same year, he again took the field at the head of a small army that he had disciplined by means of some Egyptian fusileers, prisoners or deserters, after the expedition of Gallabat. He boldly offered battle to the powerful army of Gocho near Djenda, on the north-west point of Lake Tana, and was overthrown at the first charge. His men were taken or trodden down by the cavalry: he himself took refuge, with fifteen followers, in a field of maize, where he placed them in ambush just as Gocho came upon him at the gallop, and cried to his men in the excitement of victory: "Secure this *kollenya,* this vagabond of the lowlands!" Hardly had Gocho spoken, when he fell stone dead: the *kollenya*, an excellent marksman, had pierced his forehead with a ball. Issuing from his ambush, he ran to the corpse, stripped it of the bloody doublet, and holding it up before the astounded horsemen, called out: "Your master is dead; and what do you mean to do now?" Gocho's men, so far, had had the advantage; but the death of their chief demoralized them, as is always the case in the east: the greater number laid down their arms, while others resisting, by their destruction, but added to the glory of the conqueror.

Alarmed at such a success, ras Ali sent against Kassa the best of his generals, Aligaz Faras, reinforced by auxiliaries that Oubie, already fearing for himself, decided to send him under the command of two *fit-aurari* or generals of the advance guard. Fate was as unpropitious to them as to Gocho: they were completely beaten, and Faras was killed. Ras Ali then invaded Dembea in person. The opposing armies met at Aichal. That of ras Ali was the finest; but he lacked confidence. The chief, brave enough himself, had alienated the affection of his troops by surrounding himself with scholars and astrologers. When the charge sounded, the soldiers said ironically: "Let the *debteras* (scholars) go to the front!" They did their duty, however, as well as ras Ali. But Kassa having said to his marksmen: "Aim at the silken doublets!" that is to say, upon the gilded group of officers who surrounded the ras, the staff was dispersed at the first volley, and the defeat was a complete one. Kassa pursued the defeated enemy beyond the Blue Nile, and gained over ras Ali a second victory, this time decisive. "It is God who strikes me," said the ras, with resignation, "and not Kassa." He took refuge in the ghedem or asylum of Madhera-Mariam, and thence gained the mountainous province of Lasta, which was his native country, renouncing, at least provisionally, both the contest and his authority.

In spite of these victories, the country beyond the Nile was not subdued. It still remained in arms under Beurrow Gocho, the son of Gocho, a young warrior, brave, haughty, violent, and fanatical. In ras Ali's last contest, Beurrou had offered to come and fight by his side against his father's murderer; but at a council of war held by the ras, some leaders, irritated by the pride of Beurrou, cried out: "Does this man think himself indispensable? Are there not others as brave as he?" Ras Ali had the weakness to listen to them; and declined an offer which might have saved him. In fact, a great part of Kassa's prestige depended on his personal valour, and this advantage Beurrou might easily have disputed with him. The young chief, irritated, retired to his inaccessible rock (*amba*) of Djibsela, and awaited the attack, which, for any one who knew the conqueror, it was not difficult to foresee. The latter, in fact, soon showed himself. Beurrou, immediately changing his tactics, quitted the *amba*, leaving his wife in command, and descended to the plain, commencing a war of skirmishes, about which Kassa did not give himself a moment's anxiety. He surrounded the *amba*, and brought to the foot of the fortress the brother of the lady castellan, notifying her that her brother's life depended upon her submission. Kassa had a thorough knowledge of the ideas of his country, and was well aware that conjujal affection would give way before ties of blood; moreover, the lady had before been taken from a loved husband, and forcibly married to Beurrou. She surrendered Djibsela, merely stipulating that she should not be given up to Beurrou and should see him no more. After having pillaged Djibsela and the surrounding country, Kassa set out in pursuit of his enemy, overtook him and offered battle. But the soldiers of Beurrou laid down their arms, and their chief, discouraged, did the same. Thereupon a whimsical scene took place that one might imagine was an imitation of that between the Black Prince and King John, had Kassa been a scholar. He invited Beurrou to sup with him, treating him with respectful courtesy, calling him *my lord* (*ieneta*), and offering him to drink with his own hands. The dream was a short one, and the awaking sudden. At the end of the repast, Beurrou was put in irons, and sent to the state prison of Sar-Amba (1854).

All central Abyssinia was subdued. All that remained in opposition to the fortunate son of Haïlo Mariam was old Oubie, in his vice-royalty of Tigre, and it would hardly be to know Kassa to think that he was the man to stop half-way. Did he, from that period, think of the divine mission that later he attributed to himself, and which has been the mainspring of all his actions during the best years of his reign? This I do not know: at any rate, he mentioned it to nobody. With the cunning viceroy the struggle was about to enter upon a train of negociation and diplomatic perfidy, for the right understanding of which we must refer to an earlier period and a higher theme.

II.

It is well known that, for more than fourteen centuries, the Abyssinian people have professed an oriental Catholic form of worship, into which, the interruption of communications with the rest of Christendom, has allowed many superstitions of a Coptic and Judaic character to enter, which have deceived travellers as to the real origin of this religion. The invasion of Egypt by the Mahommedans, in making of the church of Alexandria (from which that of Abyssinia hierarchically arose) an oppressed church, degenerate and barbarous, had the most disastrous influence upon the Upper Nile. Since the *abouna* or head of the Abyssinian church must, canonically, receive his investiture at the hands of the Patriarch of Alexandria, and, since the great regulator of the Abyssinian church, in the eleventh century, Saint Thekla Haimanot, had decided that the *abouna* should always be a foreigner,—probably in order to avoid nepotism on the part of the great feudal families,—there resulted therefrom a state of affairs easily foreseen. The Abyssinian clergy, generally learned and curious in theological studies, who would certainly have invented scholasticism had it not already existed, found themselves subordinated to ignorant and haughty monks from dismal Coptic monasteries where fifty years ago they still prepared eunuchs for Mahommedan harems. The Danubian principalities have had for one hundred and fifty years, their political phanariots; Abyssinia had, for seven centuries, its religious phanariots, quite as dangerous, nevertheless; for they completely stunted intellectual progress, then quite possible on the banks of the Nile, especially in theology, legislation, and national history. The Portuguese, who saved the Ethiopian monarchy in the sixteenth century, brought the Jesuits in their train, who by dint of pride, unskilfulness, and bloody follies, lost the finest position imaginable. The nation rose against them and against the imbecile and ferocious king whom they had moulded in every feature to cement their tyranny; and it is to the remembrance of this, still an object of horror to the Abyssinians, that we must attribute their distrust of Europeans, and, above all, of the missionaries who have visited them for thirty-five years.

Protestantism had taken the initiative, about 1830, and sent to Gondar the Rev. Samuel Gobat, a Swiss missionary, since called to the bishopric of Jerusalem. It grieves me to speak severely of a man whose good intentions and personal morality are beyond all suspicion; but never has a traveller seen Abyssinia in a more false light than M. Gobat. He was capable and devoted, but vain and credulous, in fact, the last man in the world to influence the most deceitful and *Byzantyne* people of the East. Three years he traversed the country, preaching and disputing with the *debteras* and priests who, for a few glasses of *tedj* (mead), made him all possible concessions, and loaded him with hyperbolical eulogies that he has registered in his journal with incredible simplicity. He left the country, persuaded that he had sown the seed in excellent soil; and the Protestant society of Missions, wondering, sent to Tigre the Moravian brethren who, like missionaries in general, were men personally honourable; but, for all that, blundering sectaries. The Moravians thought to exhibit apostolic boldness in declaring a coarse and brutal warfare against all traditions of Abyssinian worship, whether good or bad. Thus on a solemn fast day they killed a cow, the flesh of which they distributed gratuitously to every comer, looking upon it as a great triumph to have brought some poor people to sacrifice their conscientious scruples to gluttony. Their violent language with regard to the worship of the Virgin and saints, and above all a cynical remark upon the Virgin, brought down upon them the hatred of the Tigreens and Oubie, the official champion of the national religion, did a very popular act in expelling them from Abyssinia.

The propaganda of Rome had not waited for this last moment to attempt sending a mission to Abyssinia. In 1838 they had sent them a Capuchin monk, a jovial, easy and bold man, lettered withal, and capable of standing up in argument with the most subtle of the *debteras;* but the mission was not constituted till towards 1840, on the arrival of the Roman Catholic Bishop of Abyssinia, Mgr. de Jacobis, of a noble Neapolitan family, one of the most eminent of our contemporary missions. Mgr. de Jacobis brought into Abyssinia the true spirit of the church militant, invincible energy, indulgent and conciliating piety, and irreproachable morals. His enlightened charity extended from Christians to Mahommedans, in this country more fanatical than elsewhere. To the present day, the latter never speak of *abouna Yakoub* (Mgr. de Jacobis) without giving him the title of *kedous* (holy). The old sheik of Embirami, a kind of marabout, who exercises regal authority over a circle of more than fifty leagues around Massaona, replied to his disciples who reproached him for going on foot in spite of his great age: "What!

kedous Yakoub who is nearer God than I am, greater than me, and born in luxury, goes on foot from Massaona to the country of the Bojos, and shall I disdain to make an hour's journey without my mule?" Oubie, before whom all Tigre trembled, humbly dismounted when passing the door of Mgr. de Jacobis.

This apostle had only one defect: he believed more in the efficacy of diplomatic manœuvring than in that of evangelical teaching, as a propagandist. He commenced in Abyssinia with a grave error: he wished to give a turn to matters which it would have been more worthy of him to break with altogether. The patriarchal seat was vacant. Oubie, who aimed at being crowned *Negus*, announced that he would be at the expense of an embasay entrusted with the task of obtaining from Alexandria a new *abouna*, in the person of a young Copt of Minie, named Salama: but, being on bad terms with Egypt, he did not know who to send with any hope of success. He applied then to Mgr. de Jacobis, and begged him to go himself—he, appointed *abouna* by Rome—to bring his rival. Mgr. de Jacobis accepted this strange proposition without hesitation. He said to himself that, whatever action he took, a new *abouna* would nevertheless arrive; and that it was better to gain his sympathy, or, at least, his neutrality than to make himself an enemy.

Salama, the present patriarch of Ethiopia, is one of the worst specimens of the Coptic clergy. Proud, violent, greedy and quarrelsome, he divides his time between usury, intrigue and commerce. And such commerce! He carries on the slave trade, removes the sacred vessels from the churches, and sends them by bales to Egypt: one of these packages was seized and confiscated about ten years ago at Djeddah by the French consul, M. Rochet d'Hericourt. The morals of Salama are in such bad repute that, one day, his confessor, Father Joseph, revealed, in a crowded public place at Gondar, his latest confession, and informed the faithful that the Patriarch had nine mistresses, of whom two were nuns. His ignorance is proverbial; and the *memhirs* (professors of theology) maliciously submit to him questions beyond his ability to solve, from which he extricates himself by excommunicating the questioners. Since the accession of Theodore the Second, Salama has conspired ten times against him. The most diverse judgments are passed as to his religious faith: most think him a protestant, since at Cairo he was a pupil at the protestant school of M. Lieder, and since the British consulate at that city was no stranger to his appointment. This man, who thinks of nothing but money and sensual indulgence, is the most fanatical promoter of religious persecution. Thus, hardly was he installed in Gondar than, finding himself unable to contend with the influence of the Catholic mission, he had recourse to Oubie for its expulsion. Oubie, who used forcible means much against his will, was obliged to remove Mgr. de Jacobis; but he allowed him to take a good position upon the frontier in the Catholic villages of Halaï, Alitiena, and in the province of Zenadegle.

We now understand why, in 1854, Kassa summoned Oubie to pay tribute, and send the *abouna* to him. These were two signs of spiritual and temporal submission that a man, as powerful as Oubie, could not grant at the first set-off. For twenty-two years he had exercised royal authority over a country as great as the present kingdom of Poland, and had commanded these Tigreens, who looked upon themselves rightly as the elder branch of the Abyssinian people, the central and southern population, the Amharas being, in their eyes only successful fighting barbarians. The success of the latter, I ought to state *en passant*, has been greatly owing to their disposition, riper and more solid than that of the Tigreens: they, witty, amiable, careless, and anachical are, to some extent, the Irishmen of the Nile region. The cunning old man, who had conquered Tigre with the help of his mountaineers of Semen, found himself in turn face to face with a younger and more engaging Ambara than himself and who, for this was a great affair, believed in "his star." The viceroy temporised. He sent money to Kassa and then, as negotiators, his son Goangoul and his general (*belatta*) Kokobie. A provisional treaty was signed, and, during the preliminaries, Kassa had no trouble in discovering in the *belatta* one of these "wise" men who swarm about falling thrones. They plotted together the perfidious design which they did not delay to carry into execution. In the meanwhile, the *abouna* came to Gondar from Adona, the capital of Tigre. Kassa only waited for this moment to take a more decided attitude: he advanced his claim to the throne of the *Negus* and summoned to Gondar the representatives of the armed nobility, of the churches, of the towns and villages to decide between Oubie and himself, under the direction of the *abouna*.

The chances in this decisive struggle between Kassa and Oubie were unequal enough. The former had the prestige of youth, victory and eloquence, three powerful qualities, anywhere, and irresistible in chivalrous and wordy Abyssinia. It is true that they had reason to mistrust the aptitude of this out-and-out soldier for the arts of peace, whilst Oubie had secured to Tigre twenty years of repose, under a hard and rapacious yet regular government, and one that protected both the peasant and the merchant. For a moment, the balance was in the hands of the *abouna*; and it was easy to see that he would make it lean, not towards a young upstart whom he began to fear, but towards Oubie whom he had always lorded it over. At this conjuncture, it was known that Mgr. de Jacobis had arrived at Gondar—for his mischance with the *abouna* had not cured him of his tendency to make political manœuvres subservient to religious matters. On this occasion, however, he obtained, for an instant, a prospect of the realization of his hopes. Kassa, who clearly discerned his position, entered into communication with the Italian bishop, and promised, if elected, to recognise him as *abouna* of the Abyssinia church. Kassa was too much attached to the national church to make this proposition in good faith; but Mgr. de Jacobis might easily have been deceived thereby, since, from the point of view of the constitution of the Abyssinia church, the Romish bishop would be at least, as legal as the Alexandrian. Salama, hearing of this began by excommunicating Kassa and all his adherents. And then he reflected that Kassa was, after all, an ambitious man who would not scruple at a religious revolution to gain the empire, and would give strong support to an Italian bishop, should he procure the throne for him. He was not deceived as to the respect which Mgr. de Jacobis' virtues inspired in the Abyssiaian people, nor as to the profound contempt into which he himself had fallen: his only hope was in military power. It was, therefore, necessary for him to play his cards well in the competition. He came to a determination at once; and sent a promise to Kassa to ensure his election, on condition that his first act as *Negus* would be to banish Mgr. de Jacobis and his coadjutors. The compact was concluded. Some days after, the Assembly proclaimed dedjaz Kassa *Negusnagast z'Aithiopiya*, King of kings of Ethiopia, and Mgr de Jacobis was conducted to the frontier, under escort, with all the regard due to his person and character.

Completely sold and mystified, Oubie, as might be expected, did not submit to his defeat, and soon appealed from it to the sword.

He still possessed a faithful army, commanded by his son Cheton, for whom he had no great affection, whom he humiliated as much as he could, probably because he saw in him a young fool whose warlike propensities might compromise the future success of his work. Cheton had formed two squadrons of picked men, one of which wore the white *lemde,* a kind of skeep-skin scarf, and the other the black, and who had won under fire a reputation which it was their great aim to maintain. In a military point of view, therefore, Oubie was as strong as Kassa; but the latter had with him that course of events which in politics, irresistibly, and almost without effort, carries a man into power. Oubie had not, during a reign of over twenty years; displayed any of those qualities which, in a critical period, assure a prince of the enthusiastic aud affectionate devotion of his subjects. He had sown duplicity, perjury and a vulgar and ignoble dread; now he was about to reap desertion and open treachery. The viceroy of Tigre had just re-entered Semen when his rival came up with him, after a tiresome march, in view of the plain of Dereskie, where was the line of the Tigreen army stretched over a great extent of ground. Kassa immediately ordered the attack. His troops replied by a general murmur of discontent; and the Negus, for a moment, was perplexed; but he quickly saw that hesitation could only compromise a victory that seemed sure to him. He passed down the lines of his army, addressed his men in brief and energetic language, recalled their former victories, and spoke disdainfully of the enemy. "Is it that impotent old man," said he, "who is to stop your path? Are you afraid of these muskets loaded with powder and rags? Shall these rocks and precipices hinder your courage? Follow me, and, by the will of God, I shall not call myself Kassa, to-morrow!"

The first charge of the Amharas was vigorously received by Oubie's fusileers, who made great breaches in their ranks. At the same time, brave Cheton, followed by his black and white squadrons, attacked with fury; and Oubie himself, in spite of his infirmities, set his soldiers an example of unlooked-for boldness. The battle was for a long time undecided; but at last, Cheton fell, severely wounded. Oubie had his leg run through with a lance in the hands of Kassa himself, and his general Kokobie, with his division, either went over to the enemy, or remained neutral (the fact has not yet been satisfactorily cleared up). The victory was complete. Oubie fell into the hands of the conqueror. Cheton, forgotten upon the field of battle, dragged himself to the caverns which rise above the beautiful valleys of the Menna, and died there from the effects of his wound. When Kokobie came to receive the reward of his treason, he met with an unexpected reception: "I distrust a servant who sells his master," replied the Negus coldly; and Kokobie, placed in irons, was thrown into the prison of Tchelga, where he still remains.

The battle of Dereskie was fought on the 5th of February, 1855. Two days after, the victor caused himself to be crowned with great pomp, amid the applause of the army and clergy, in that very church of Dereskie which the vanquished of the other day had, in view of his own coronation, caused to be built and adorned under the direction of a European who had established himself in Abyssinia, Dr. Schimper, a naturalist well known in France. This mockery of fate was not one of the least of Oubie's troubles. Kassa assumed the name of Theodorus, which had been borne before him by a Negus that had reigned not without glory, towards the twelfth century. This name was, so to speak, the programme of his reign. A tradition, universally known in Abyssinia, and cited by nearly every traveller since Bruce, says, that a Negus, of the name of Theodore, should restore the Ethiopian empire to its ancient glory, destroy islamism, and free Jerusalem from the crescent:—a persistent and touching hope with which a people, borne down by oppression, tries to escape from its deceptions of the present. The new Negus picked up this name from the national legends, and affirmed with familiar boldness that he was the man of the prophecies. It is certain, that, in 1855, all Abyssinia believed it, even if it have not the same faith to-day. As for himself, was he then really convinced? This is a delicate question to which even, after having known him personally, I know not what to reply. I think, however, that he was sincere, and that, for many reasons too long for detail. This confidence inspired him with strangely ambitious projects. It was then that he proposed to the Czar, "his brother of Moscow," to combine a march upon Jerusalem, and divide the Mahommedan world; but it has also incited him in a more practical way to do great things, by which Abyssinia has profited.

There still remained the fragment of the party just subdued to be dealt with. The taking of the plateau of Amba-Hai completed the submission of Semen. Upon this height of about 13,000 feet, Oubie kept his treasures, 40,000 talaris, much gold and silver in ingots, and seven thousand muskets, in the charge of one of his sons. The conqueror brought Oubie before the fortress, loaded with chains, and informed the young prince that the life of his father depended upon his submission. This unchivalrous retort had the expected effect, and the place capitulated. In Amba-Hai or a neighbouring citadel, the valiant Sobhigadis-Kassa, son of the prince of the same name who was killed in 1831 in the fight of Mai-Islamai, and the victim of signal treachery on the part of Oubie, had been confined for seventeen years. He ran the risk of only making a change of jailor, when his daughter, a very young and remarkably beautiful princess, boldly sought out the new negus and supplicated him for her father's liberty. Her filial affection, and still more her beauty, made a favourable impression upon the young conqueror, who gave Sobhigadis his liberty, and took the graceful suppliant for a favorite. The conquest of Tigre was accomplished: the negus gave this important vice-royalty to Balgada-Araea, a brilliant soldier without administrative capacity, and then, strong enough to dare everything, he put Oubie in fetters.

Theodore was then maturing a project dear to the patriotism of every Abyssinian—that of commencing a crusade against the Turks, masters of the lowlands that had formerly belonged to Abyssinia. His southern troubles did not leave him time to act. In the group of mountains which separate Choa from the rest of the empire, there lived a Mahommedan people of foreign race, the Ouollos, an advanced colony of that powerful Galla stock, which, for three centuries, beating upon the frontiers of Ethiopia like a raging ocean, has already half devoured it. A confederation of independent chiefs, of whom the most powerful were then Oarhet, princess of Worra, and Adara-Bille, lord of Tehuladere; the Ouollos had stirred up the legitimate wrath of the Abyssinian Christians; they were to a certain extent the free lances of Africa, lending to the highest bidder their formidable cavalry, and adding to the horrors of civil war the severity of their fanatical hatred towards the Christians. Theodore the Second, who had had to do with these ferocious mercenaries, had sworn forever to prevent them from drenching the Christian provinces with blood, and they had the impudence to provoke him at the very moment of his most brilliant triumph. He learned that the Ouollos, led by the princess Oarhet, had overstepped the abrupt slopes of the Bachilo river, and had ravaged the Christian provinces, and, in these, especially the churches. Theodore marched against them. Oarhet retired, and the negus, taking as the base of his operations the left bank of the Bachilo, set himself to conquer the whole land of the Ouollos. They, commanded by Adara-Bille, bravely offered battle to the negus, and were cut to pieces; their chief was left upon the field, and the prisoners were maimed without mercy. The survivors relinquished the contest in the open plain and retired to the mountains, leaving the victor to pillage the level country, and carry away thousands of captives, whom he distributed among his soldiers. The negus then selected, for winter quarters, the post of Magdala, impregnable by Abyssinians, upon the left bank of the Bachilo: he made it at once his arsenal and chief state prison, and accumulated there thousands of muskets, which, thanks to long inaction and improper handling, are, to-day, nearly, useless.

Theodore, although victorious, had lost the greater part of his army, and for the present relinquished his designs upon the Ouollos. Another design occupied him altogether elsewhere. The narrations of our countrymen, Rochet d'Hericourt and of Major Harris have made known to us the kingdom of Choa, founded a century and a half ago by a fortunate chief, who took advantage of the negus' feeble government to dismember the empire and form a dynasty upon the extreme south-eastern frontier. The military policy of Theodore the Second required that this branch, broken off by revolution, should return to the parent stem, and circumstances were favourable for its accomplishment. Death had seized upon Tahle-Talassie, a sagacious prince, although hardly the African Solomon of whom more recent travellers speak. His son, Melchot, was far from inheriting his political sagacity, or rather a sly good nature that concealed an energy which the vassals took good care not to come in opposition to. Theodore marched from Magdala upon Aukober, the capital of Choa, and Melchot came against him with a numerous and well-disciplined army. Upon the night preceding the battle, Melchot died suddenly. It were easy to make strange conjectures upon this opportune death; but what proves Theodore beyond the suspicion of poisoning, is that no word of it has been breathed in a country so distrustful as Abyssinia. The nobles, filled with consternation, met in council. They all agreed, above everything else, to support the independence of their little state, to fight at all hazards, and, in order to prevent the discouraging impression of this event upon the *morale* of the soldiers, to hide it from them. Accordingly, the next morning, the Choas marched valiantly against the enemy, preceded by a closed litter supposed to shelter the person of the suffering king; they fought admirably, but ended by being routed. Theodore followed up this victory with a rapidity to which the Abyssinians were not accustomed; he scaled the formidable position of Aukober, built on the summit of a sugar loaf, which wild goats find it hard to climb, annexed the kingdom to his empire, put a small number of influential chiefs in irons, had the policy not to irritate the inferior nobility, to whom he left their offices and commands, annulled the treaties concluded by Tahle-Talassie with England and France, and triumphantly pointed upon Deora-Tabor the English and French cannon found at Aukober. He had not yet left the country when he received the news that the faction of Beurrou was still stirring in Godjam. He flew there with the rapidity of lightning, and caused torrents of blood to flow. A woman was burned alive for the sole reason that she was the mother or wife of one of the insurgent chiefs. These executions, however, did not root out the spirit of local independence which reigned in these distant provinces. One year after the departure of Theodore, Tedla-Guatu, the young chief to whose care he had confided Godjam, declared himself independent and refused tribute.

At this same time (July, 1855), another more serious insurrection arose in Tigre, where the family of Oubie had still many partizans. The young sons of Oubie, not daring to risk the life of their captive father by rising openly, had cast their eyes upon an old companion in arms of Theodore, who, since the battle of Dereskie, had retired to the mountains of Sernen—Agan Negoussie.* When proclaimed negus, Negoussie appeared irresolute, and for some time refused the honour; semi-violence was necessary to make him ascend the *alga*, or in other words, the throne. Having taken this decisive step he was compelled to act, and either to gain or crush the neighbouring undecided chiefs. Negoussie marched against them, defeated them, and made a solemn entry into Gondar, where he was received (August, 1855) by the *debteras*, already annoyed at the reforming proclivities of Theodore the Second. Thence he marched upon Tigre, where the Theodorist party had fortified itself under the direction of the viceroy Balgaduatroca. The brother of the latter fell, near Haouzene, in a bloody battle, in which Negoussie was at the same time wounded and the victor. All the surrounding provinces at once proclaimed the pretender. Revolt was everywhere victorious; but it was at that very time that it received its check. All looks were now turned towards Gondar, which Theodore had just re-entered, and greedily they questioned the mystery still enveloping the policy of the new reign.

---

* *Agan*, the name of the native county of Negoussie.

III.

The first acts of Negus Theodore the Second were marked by a practical good sense, and a moderation which singularly contrast with his present conduct. If, however, at the very moment when the bells of Dereskie announced his accession to the throne of the Davids and the Fasilides, he had thrown a look at the past, and thought of the still recent period of his proscription and misery, one might easily understand that his head would have been turned. Yet never was it sounder than at that critical moment, and the course that he followed during four years, well justifies the infatuation of which he was, at first, the object on the part of some Europeans. His idea was a very simple one. He wished to regenerate Abyssinia, and to draw the elements of this regeneration from its ancient civilization. This idea, at bottom chimerical, was very seductive to the enormous national pride of the Abyssinians, and did not expose the Negus to the same resistance as that which forced the Czar Peter and Sultan Mahmoud to inaugurate their reforms with bloodshed.

Abyssinia, even at the period of its greatest declension, offers to the eyes of the unprejudiced traveller, the principal strata of a tolerably advanced social order. The feudal system exists there but not more powerfully than in England; the institutions are very democratic, the machinery of administration simple, the code is that of Justinian with some modifications, rendered necessary by the genius of the people, property is well defined, individual rights are guaranteed by the right of appeal to the emperor, family relations are secure, commerce is protected, and the vengeance of the state and the atrocities of war are neutralised by the inviolability of numerous *ghedem* (asylums). The law is good and futile in itself: it is the fault of barbarism, brought about by endless anarchy, if the nobility is contentious and plundering, the church avaricious, justice venal, marriage annulled by the contagious example of the aristocracy, and the right of asylum, and of caravans sometimes violated, all that was necessary, according to the victor of Dureskie, was to return to the ancient royal code (*tarika nagast*), and apply it with unsparing vigour.

The cares of Theodore, in the early part of his reign, were divided between judicial and religious reform. The chief necessity of Abyssinia was the security of the roads and of the rural districts in general, infested, in every part, by plundering bands. A royal proclamation, dated from the camp of Ambadjara, near Gondar (August, 1855), ordered "that every one should return to the profession of his father, the tradesman to his shop, the peasant to his plough." The edict was executed with Draconian rigour; and things, otherwise impossible in Abyssinia, began to shew themselves. The people of Tisbha, incorrigible bandits, whose village occupies a counter-fort of the mountain of Ifag, came to the camp of Theodore, armed to the teeth, and demanded from the Negus the confirmation of their right to exercise the profession of their fathers, recognised by David the Great. "What is this profession?" asked the Negus without distrust. "Highway robbers," they replied insolently. "Now listen to me," said Theodore, surprised, yet calm, "your profession is a perilous one, and agriculture is more profitable. Come down to the plain and cultivate it: the Lamghe is the finest land in the empire. I will give you oxen and ploughs myself." They were immovable. The Negus ending by saying, "Yes," and sent them away. While returning, proud, as they thought, of having intimidated the sovereign, they were joined on the road by a squadron of cavalry, the leader of which clearly proved to them, that if David the Great had authorized them by charter to live upon the highways, there was a decree of one greater, the holy king Lalibela, who authorized the police to cut down all robbers. Thus, not one remained, and, for my part, I was not annoyed in the least when I came to make a stay in Tisbha, in January and in May, 1863.

The judicature was very depraved. There was at Gondar a kind of supreme court, that of the twelve *likuouent** for the preservation of the code, which was co-extensive with the imperial authority. Several traits of jocular venality are recorded of it, as that of *lik* Asgo, who, having accepted a pot of honey from the plaintiff, and a mule from his adversary, and then, having favoured the latter, replied to the complaints of the former: "What do you want, my friend? your pot has been broken by a kick from a mule!" The Negus had tact enough not to break the law with regard to these audacious perverters of justice, and to receive their resignation from themselves. In a matter in which he was personally interested, he assembled the *likuouent*, and laying the question before them, asked what the code decided. "Sire," replied the judges, "the code is your majesty." He took them at their word, and suppressed their jurisdiction, leaving them an honorary life, title and annuity, and substituting himself in their place as a court of appeal for the whole empire. In view of the quibbling character of the Abyssinian people, such a labour would have frightened any other than this indefatigable worker. I have personally been in a position to judge of Theodore's great activity, as attested by other travellers. After a prolonged vigil, the Negus would take three or four hours of sleep, interrupted, from two o'clock in the morning, by the numerous pleaders who came to take their places, uttering a cry which represents the *Naro* of the Normans: *Djan-ho, djan-ho, djan-hoï!* (majesty! majesty!). The suits commenced almost immediately, and were, sometimes, not over till ten o'clock. A square composed of officers, soldiers, and suitors, awaiting their turn, formed the audience. This expeditious open-air justice, has been one of the principal causes of the popularity of the Negus: it was severe in great matters, jocular in small. One day a peasant was pleading against the *tcheka* (mayor) of his village, who had called him *donkoro* (blockhead), an injury provided for in the code. "You must pay the fine," said the Negus to the mayor;" "there should be no blockheads in my realm." Another day, they brought him a soldier who had murdered two merchants upon the road. "What did you kill them for?" asked the Negus. "Because I was hungry." "But could you not, at least, only have taken from them what was necessary, and spared their lives?" "If I had not killed them," replied the soldier innocently, "they would have defended their property." The emperor, exasperated at this ingenuous remark, had both his hands cut off: had them served upon a plate, and said to him: "Ah, you were hungry? Well! eat!"

---

* Plural of *lik*, judge.

This Draconian system had immediate effects. The roads, up to that time drenched with gore by robbery and civil war, now became as secure as those of France and Germany. An inhabitant of Djenda informed me, that the year before, not a single market day passed in the village without an assassination: under the new reign, not a single murder has transpired, either in the borough or its suburbs. One must read travels taken in Abyssinia, from 1830 to 1845, in order to appreciate the benefit of a security obtained in so short a time, and the vigour of the hand which has brought it about. For my own part, I remember being ten times benighted at a distance of from two and a half to four miles from my residence, in company with a single servant, unarmed like myself, and never has the idea entered my mind that I could run the shadow of a danger. Certainly on Ethiopian territory I had not been as tranquil.

It was not the public roads alone that called for the establishment of order; society no less required it. An unbridled feudal system, in spite of the laws, had nearly suppressed marriage; it had become the fashion to replace the religious ceremony by a civil bond, broken by the first caprice. All the great barons had, around the legal *sizoro,* the matron treated with dissembled respect, haughty, indolent, and deserted, a staff of pert, pretty faced servants, dividing their not very rigorous affection between their all-powerful master and the dissipated young fellows who encumbered the ante-rooms. It was a harem without the name. Powerless to check such a course, the negus did at least some good, first in setting an example, and afterwards by making a decree obliging all officers and soldiers to have but one wife.

The most dangerous work to attempt was religious reform. The friends of absolute classification have not hesitated to declare the Abyssinian Church heretical and Eutychian. The truth is that Abyssinian Christianity is Catholicism, but a barbarous description of it; Eutychianism is but an opinion, by no means officially recognized, and, like others, subject to dispute; and Abyssinia is only separated from the Romish Church by insignificant questions, which Rome was the first to turn to account. The Abyssinians received Christianity in the fourth century from the Church of Alexandria, with which they remained closely connected. In order still more to confirm this union, the ecclesiastical constitution, promulgated by the famous Saint Thekla Uaïmanot in the twelfth century, decreed that the *abouna*, or Abyssinian archbishop, should always be a foreigner, a Copt, nominated by the patriarch of Alexandria. The same constitution gave to the Church two-thirds of the crown lands, an enormous and burdensome property, which was augmented by the numerous gifts of the negus and of the more pious *balagoult* (nobles; feudal lords). All the abuses of mortmain weighed heavily upon the peasants, tenants of the Church, which had become grasping and rapacious, while they were not compensated for it by the inviolability which these privileged lands enjoyed in time of war. The negus brought the iron hand of a victorious leveller to bear upon this sacred institution: after a violent philippic against the vices of the clergy, he declared mortmain an iniquity and a national evil, and made all the church lands pass into the crown domain, securing a revenue for the deserving, leaving to the abbeys ground enough to support their inhabitants, and to the *abouna* some fine possessions, as Addi-Aboun, near Adona, in Tigre, and Djenda, in Dembea. The people looked upon this reform with considerable favour; but in all conspiracies and after revolts Theodore discovered without much astonishment the mysterious hand of the *abouna* and the numerous body of which he was the head.

The peculiarity of absolutism is a love of the *see-sawing* order of politics presenting alternate rise and fall. To the *abouna*, whom he stripped and yet feared, Theodore, a little against his inclination, had granted the proscription of Roman Catholicism. Personally, he sympathized with Mgr. de Jacobis; but in matters of religion he professes the opinion of Louis XIV., that a well governed state should have but one faith, that of its sovereign. Hardly had Mgr. de Jacobis been escorted back to the frontier, than a strong body of cavalry fell upon the peaceful village of Alitiena, near Halaï, the retreat of the Italian Bishop; their intention was to sack the church and expel the priests; the peasantry defended their pastors at the price of their blood, for one of them was killed and several wounded. All these impolitic severities were a sad inauguration for the new reign, and religious correspondence, marked with irritation, often pushed to the length of injustice, announced to Europe the restorer of Ethiopia as a second Diocletian. I have known the negus well enough to be persuaded that he listened to no reasons but those of state, and that fanaticism was not an element in these outrages. He felt, however, that they might injure his European reputation, and, to guard against this, he addressed a letter to the English and French Ambassadors at Massaona in which he represented the measures taken against the missionaries as the punishment of their political intrigues; which he, as we have seen, was the first to provoke and make use of. He declared, besides, that in order to prove that he had not been moved by blind hatred of Europeans, he was ready to load with presents and grants of land all who would come and initiate the Abyssinians in the knowledge of agriculture and the manual arts.

Under acts so contradictory from a moral point of view, it is easy to discern the trace of a single thought which was wanting neither in logic nor in grandeur. "The empire has decayed," said the negus, "because the legitimate sovereigns have ceased to rule with a strong arm, an intelligent head, and a pious heart. God has withdrawn His favour from the line of Solomon; He has given strength to the barbarians, to the Turks who have deprived us of Lennaar and Massaona, to the Gallas who have driven us back as far as Alaï; but as He does not wish His people to perish, He has raised me from the dust and commanded me to restore the imperial power, such as it was in the time of the negus Kaleb and the glorious emperors who conquered Yemen, and, finally, everywhere to reclaim from mussulman sway the ancient limits of Abyssinia. *My empire extends to the sea......*" This last expression was a rather serious one, for it announced his intention of regaining by the sword the wild and almost desert sea-board snatched by the Porte in the sixteenth century from the careless and feeble grasp of the *King of kings.* The governors of Massaona are by no means sure, even to-day, as to the definite designs of their formidable neighbour, who is too intelligent not to perceive that, to a great state, a seaport is absolutely necessary, and that without this it must depend, even for its most fundamental necessities, upon more favoured states. The Porte, which derives neither political nor pecuniary advantage from Massaona, is well aware that it possesses the key of Abyssinia, and, too feeble to profit thereby, as it would have attempted under Selim the Great, it takes a childish and mischievous delight in weakening a great Christian state by keeping a sharp look out that she receives neither arms nor munitions of war. It remains to be seen what will become of this old prohibition when the negus, with happier inspiration, will be pleased to reply frankly to the advances of Europe, and to ask from it these improved weapons which he endeavours, with so much expense, to have imitated in his dominions.

His pretensions to Sennaar and Nubia are very questionable, and may be explained by a misunderstanding that is supported by the pedantic European courtiers who surround him. The Abyssinians, in adopting Christianity, have endeavoured to identify themselves with some one of the nations recorded in the Old Testament, and, as their Bible has been translated from the Septuagint, they have taken without ceremony the name of Ethiopian, which they have applied to their ancestors. In place of the title "Kings of Axum," which appears to have been the first known to their sovereigns, was substituted, nobody knows when, that of *Kings of Ethiopia.* It is hardly necessary for me to recall the fact that the Ethiopia of the Greeks and Romans comprehended, in its most vague extension, the whole of Eastern Africa, except Egypt, and in its more precise and restricted sense, all Nubia from Syene. It is known now where reigned the two queens Candace, and where Meroe was. Theodore the Second, little versed in these erudite subtleties, only knew that he was emperor of Ethiopia, and that, in the time of David and Solomon—in his eyes, the *beau-ideal* of historic times—Ethiopia extended to the tropics: thus, since his accession, he has announced his intention of retaking from the Egyptians all Nubia as far as the other side of Dongola, leaving the execution of it to a more favourable period.

I have not yet spoken of two men, who have had, over the Negus Theodore, a great influence, that some writers have even exaggerated. They were two Englishmen, Messrs. James Bell and Walter Metcalfe Plowden. The latter was appointed English Consul at Gondar; and, in 1848, concluded a commercial treaty with ras Ali. He had early foreseen the high destiny of Kassa, and had attached himself to him, following him everywhere, living to a great extent upon his bounty, but never asking for recognition as consul, for the suspicious distrust of the Abyssinians would not have accorded it. "We do not wish," said an Abyssinian chief, in 1856, to the French consul of Massaoua, "We do not wish to allow foreign consuls to set themselves up like separate states in our empire. We have welcomed Mr. Plowden as a traveller. It is said that he is a consul; but had he demanded the privileges of his title (added this chief with the braggadocio characteristic of his nation), he had not lived for twenty-four hours.*

Mr. Bell was an old volunteer of the English navy, attracted to Abyssinia by the love of the unknown, and retained near the person of the future emperor by a sympathy which had ripened into a kind of worship. A long time before the battle of Dereskie, he attached himself to his fortunes, good or bad, watching over him like a faithful mastiff, sleeping across his doorway. And this ardent sympathy was to a great extent reciprocated. The Negus listened, with pleasure, to his disinterested and sincere, although sometimes bold counsels; and got him to explain to him the history, comparative strength, policy, and present situation of the European States. A single fact may help to form a judgment as to the ascendancy of Mr. Bell over this strange man. One day, when he had asked justice from his royal friend for I know not what grievance, and had not obtained it, he remembered the old feudal custom, which allows the Abyssinian nobleman, on horseback and under arms, to speak to the sovereign with the most absolute freedom. He immediately took his lance and shield, mounted his horse, found the Negus seated among all his chiefs at the door of his tent, and reproved him sharply for his caprice, tyranny, and ingratitude. Theodore did not say a word. In the evening, the two friends were at supper together as usual: the Negus went out for a minute, then returned, bearing a heavy stone upon his neck, and bent down before Mr. Bell. According to the law of the country, every offended party has a right to this reparation on the part of the offender, whatever may be their difference in rank, and the Negus, as restorer of old customs, could not withdraw himself from it. Mr. Bell, surprised and confounded, flew towards him, took the stone in his hands, and, with respectful abruptness, begged him, for the future, not to forget his royal rank. It is well to add, that this Englishman, treated with so much regard by Theodore, had the title of *likamankuas*, that is to say, he was one of the four officers who on the day of battle wear the same dress as the Negus, in order to confuse the enemy when determined on his death: a perilous and purely honorary position, for it brings with it neither fief nor emolument, yet is eagerly sought after by a monarchical and chivalrous people. Mr. Bell was master of ceremonies to all Europeans that came to see his prince. His obliging disposition had no bounds, and knew no nationality. He preserves Theodore in those feelings of sympathy for France, which are natural to the Negus.

---

* The jurisdiction and exceptional immunities which consulates enjoy, make them, in the eyes of the Abyssinians, little sovereignties; and, according to them, the establishment of these agencies in Abyssinia would be equivalent to a dismemberment of the empire.

(*To be continued.*)

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST.—OCTOBER, 1864.

Latitude—43 deg. 39.4 min. North. Longitude—5 h. 17 min. 33 sec. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resultant Direction.	Velocity of Wind.					Rain in Inches.	Snow in Inches.
	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M	2 P.M.	10 PM	ME'N		6 A.M	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A.M.	2 P.M.	10 P.M.		6 A.M	2 P.M	10 PM	Re-sul't.	ME'N		
1	29.890	29.776	29.683	29.7753	°45.0	°49.0	°48.9	°47.80	— °2.62	.210	.253	.337	.270	.70	.73	.94	.80	E N E	E b N	E	N 86° E	7.6	14.5	13.0	11.79	11.89	1.190	...
2	.647	.709	—	—	50.4	55.1	—	—	—	.361	.386	—	—	.99	.89	—	—	E	N E b N	E b N	N 70 E	5.5	5.5	1.5	2.90	3.03	0.030	...
3	.829	.796	.806	.8163	51.1	56.9	54.7	54.55	+ 5.02	.352	.374	.414	.385	.94	.80	.97	.91	N E b E	E S E	E S E	N 57 E	4.0	5.0	0.5	2.36	3.77	0.010	...
4	.844	.834	.803	.8250	54.0	59.8	50.0	54.18	+ 5.15	.346	.417	.335	.362	.82	.81	.93	.86	N b W	W b S	Calm.	N 27 W	3.8	0.8	0.0	0.98	1.45	...	...
5	.752	.672	.562	.6567	47.2	56.9	55.8	53.77	+ 5.15	.287	.374	.434	.371	.89	.80	.98	.89	N N E	E	N E b E	N 76 E	3.5	8.5	5.0	4.09	4.33	0.405	...
6	.438	.230	.195	.2677	55.1	64.8	52.2	56.95	+ 8.73	.432	.542	.276	.406	.99	.88	.70	.85	N E b E	S b W	W S W	S 49 W	0.8	4.0	10.8	6.32	8.02	0.010	...
7	.246	.189	.087	.1715	51.5	54.4	52.2	52.52	+ 4.67	.306	.299	.348	.308	.80	.69	.89	.77	S W	S W	S	S 49 W	11.2	10.8	8.5	8.62	8.97	0.018	...
8	.026	.233	.416	.2378	42.5	37.4	35.6	38.27	— 9.18	.200	.179	.134	.169	.73	.80	.65	.72	W S W	N W b N	N W b N	N 35 W	5.2	25.0	15.5	16.11	16.38	0.035	Inp.
9	.516	.512	—	—	30.2	40.7	—	—	—	.142	.120	—	—	.84	.47	—	—	N W b W	W	S W	S 73 W	3.0	7.5	5.5	7.04	8.88	..	...
10	.209	.302	.603	.3935	47.2	55.8	40.7	47.03	+ 0.37	.250	.199	.196	.213	.76	.43	.77	.67	S W b S	W N W	W N W	N 85 W	20.5	21.0	6.0	10.88	12.65	...	...
11	.724	.758	.696	.7193	35.2	49.0	42.1	43.18	— 3.07	.183	.245	.204	.215	.89	.69	.76	.77	N W b N	S S W	N	N 83 W	2.2	5.5	6.4	1.16	3.17	Inp.	...
12	.575	.465	.529	.5193	41.7	45.0	39.6	41.87	— 4.10	.228	.269	.210	.236	.86	.90	.87	.88	N	N	N W	N 44 W	3.5	1.0	10.5	5.44	5.78	0.200	...
13	.561	.514	.546	.5440	32.4	46.4	39.6	39.77	— 5.80	.161	.140	.219	.177	.87	.43	.90	.74	N W b W	N W	N b W	N 33 W	2.2	18.0	8.5	9.13	9.35	0.008	...
14	.538	.468	.446	.4808	33.4	49.7	38.5	41.02	— 4.25	149	.169	.182	.167	.78	.47	.78	.66	N	N W b N	N W b N	N 37 W	10.5	9.0	7.6	7.53	7.77	...	...
15	.400	.320	.293	.3373	28.4	51.1	42.5	41.93	— 2.92	.134	.239	.139	.181	.86	.63	.50	.67	N W b N	S W b S	N W b N	N 65 W	2.8	8.0	5.0	3.88	5.25	0.230	...
16	.207	.305	—	—	42.8	46.8	—	—	—	.250	.217	—	—	.90	.67	—	—	N N E	W N W	W	N 86 W	4.5	15.2	10.0	9.65	10.70	0.085	..
17	.567	.605	.618	.6030	34.5	45.7	36.3	39.45	— 4.78	.173	.159	.168	.170	.86	.51	.78	.71	W b S	W b S	W	S 86 W	9.0	15.8	3.5	8.37	8.45	...	...
18	.475	.416	.417	.4325	35.6	46.1	41.7	41.33	— 2.70	.177	.180	.200	.192	.85	.57	.73	.74	W	W b N	W b S	S 86 W	3.5	13.4	5.8	6.35	7.28	0.020	...
19	.371	.371	.493	.4237	41.4	47.2	37.0	41.93	— 1.85	.221	.211	.193	.208	.85	.64	.87	.78	W S W	W N W	W N W	N 80 W	5.8	16.0	3.8	6.39	6.71	0.018	...
20	.533	.578	.687	.6127	36.0	47.2	43.4	42.00	— 1.57	.180	.220	.206	.201	.85	.67	.73	.75	S W b W	W N W	W N W	N 71 W	5.0	11.8	6.5	8.25	8.51	...	...
21	.705	.651	.607	.6548	41.0	47.5	38.1	42.25	— 1.00	.218	.225	.204	.213	.85	.69	.88	.79	N W	W b S	N W b W	N 65 W	7.6	5.8	1.0	3.35	3 88	0.012	...
22	.514	.460	.425	.4608	40.7	50.4	43.9	44.93	+ 1.97	.204	.208	.235	.216	.80	.56	.82	.73	N N W	W N W	W b S	N 81 W	5.0	12.0	3.6	4.76	5.17	...	...
23	.357	.249	—	—	43.5	50.4	—	—	—	.240	.258	—	—	.85	.70	—	—	S W b W	S W b S	N N W	S 80 W	1.5	7.5	2.8	1.47	2.97	0.015	...
24	.371	.513	.637	.5270	42.8	42.1	42.1	42.33	— 0.17	.250	.241	.232	.236	.90	.89	.86	.87	N b W	N b W	N N W	N 8 W	1.0	5.8	2.5	3.64	3.93	Inp.	...
25	.722	.706	.754	.7327	39 6	49.7	39.9	42.95	+ 0.65	.219	.226	.198	.210	.90	.63	.80	.76	N W b N	S S W	N W b N	S 77 W	2.8	8.0	6.6	1.24	4.32	...	...
26	.745	.706	.580	.6683	37.4	47.5	44.6	43.88	+ 1.90	.179	.264	.245	.237	.80	.80	.83	.82	N b E	E N E	E b N	N 75 E	5.2	8.4	10.0	7.41	7.68	Inp.	...
27	.443	.287	.228	.3090	43 9	47.9	49.0	47.15	+ 5.37	.264	.321	.337	.306	.92	.96	.97	.94	E N E	E	S S E	N 82 E	7.0	5.5	5.0	4.86	5.31	0.110	...
28	.062	.048	.237	.1303	49.3	50.0	46.8	48.47	+ 6.98	.338	.313	.302	.320	.96	.86	.94	.94	N E b N	N W b W	W N W	N 60 W	4.8	17.2	11.2	10.19	10.81	0.720	...
29	.367	.438	.551	.4630	45.4	47.1	43.5	45.28	+ 4.02	.292	.304	.259	.283	.96	.94	.92	.93	W	S W b S	N b W	N 46 W	1.8	0.5	0.5	1.12	1.89	0.155	...
30	.577	.613	—	—	42.5	49.3	—	—	—	.244	.262	—	—	.89	.75	—	—	N b W	S S W	W b S	N 67 W	5.0	6.4	0.5	1.54	3.18	0.050	...
...	.681	.761	.854	.7748	42.1	41.7	36.7	39.57	— 1.18	.249	.191	.179	.197	.93	.72	.82	.80	N N E	N b W	W	N 11 W	4.2	6.8	4.0	4.30	4.96	...	...
M	29.5226	29.5037	29.5290	29.5207	42.09	49.47	43.67	45.17	+ 0.13	.239	.260	.246	.248	.86	.71	.83	.80	....	....	....	....	5.16	9.68	5.86	......	6.66	3.321	Inp.

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR OCTOBER, 1864.

Note.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer..............................29.890 at 6 a.m. on 1st } Monthly range =
Lowest Barometer..............................29.026 at 6 a.m. on 8th } 0.864 inches.

Self-regist'ing Thermom.
Maximum Temperature ....67°0 on p.m. of 6th } Monthly range =
Minimum Temperature ....28°0 on a.m. of 15th } 39°0
Mean maximum Temperature .... 52°05 } Mean daily range=
Mean minimum Temperature .... 39°73 } 12°32
Greatest daily range ......26°0 from a.m. to p.m. of 15th.
Least daily range............ 3°2 from a.m. to p.m. of 24th.

Warmest day .... 6th... Mean temperature............ 56°95 } Difference = 18°68.
Coldest day .... 8th... Mean temperature .... 38°27 }
Maximum { Solar.................................. 106°5 on p.m. of 4th } Monthly range =
Radiation. { Terrestrial......................... 19°8 on a.m. of 18th } 86°7
Aurora observed on 2 nights, viz.,—on 12th and 19th.
Possible to see Aurora on 11 nights; impossible on 21 nights.
Snowing on 1 day; depth inappreciable; duration of fall, 1 hour.
Raining on 22 days, depth 3.321 inches; duration of fall 101.0 hours.
Mean of cloudiness = 0.74; above average 0.11.
Most cloudy hour observed, 2 p.m.; mean = 0.81; least cloudy hour observed, midnight; mean, = 0.65.

Sums of the components of the Atmospheric Current, expressed in miles.

North.	South.	East.	West.
1811.61	675.17	844.89	2891.17

Resultant direction N. 60° W.; Resultant velocity 3.17 miles per hour.
Mean velocity ....6.66 miles per hour.
Maximum velocity .... 30.7 miles, from 6 to 7 a.m. on 10th.
Most windy day ...... 8th............Mean velocity, 16.38 miles per hour. } Difference=
Least windy day......4th............Mean velocity, 1.45 ditto } 14.93 miles.
Most windy hour ...... 1 to 2 p.m.........Mean velocity, 10.15 ditto. } Difference=
Least windy hour ...... 3 to 4 a.m.........Mean velocity, 4.84 ditto. } 5.31 miles.

2nd. Fog 6 a.m.—4th. Solar halo at 7 a.m.—5th. Heavy dew at 6 a.m.—6th. Very dense fog 6 to 8 a.m.; lightning and thunder in N.W. 5.30 to 6.30 p.m.—8th. Particles of snow 8.30 to 11.30 a.m. (first of the season).—9th. Thin ice at 6 a.m.—11th. Hoar frost 6 a.m.; faint lunar halo at midnight.—12th. Auroral light in N. from 11 p.m.—13th, 14th, and 15th. Thin ice at 6 a.m.—16th. Fog at 6 a.m.—19th. Perfect rainbow at 4.20 p.m.; auroral light and streamers 7.30 to 8.30 p.m.—26th. Hoar frost at 6 a.m.—27th. Dense fog at 4 p.m.—28th. Dense fog 6 a.m.—29th. Fog from 4 p.m.—Almost constant rain from 9 a.m. of 27th to 7 a.m. of 30th.

The month of October, 1864, was comparatively cold, wet, windy and cloudy; the number of days on which rain fell was nearly double the average.

COMPARATIVE TABLE FOR OCTOBER.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above aver'ge (26.1)	Max. observed.	Min. observed.	Range.	No. of days.	Inches	No. of days.	Inches	Resultant. Direction.	Resultant. V'y.	Mean Force or Velocity.
	°	°	°	°	°							
1840	44.4	— 1.2	68.5	23.9	44.6	13	1.860	3	...	...	...	....
1841	41.6	— 4.0	58.3	20.3	38.0	6	1.360	2	...	...	...	0.41 lbs.
1842	45.1	— 0.5	68.5	30.0	38.5	8	5.175	0	...	...	...	0.55
1843	41.8	— 3.8	65.7	24.5	41.2	12	3.790	4	2.5	...	...	0.54
1844	43.3	— 2.3	69.6	17.8	51.8	7	Imp.	4	12.0	...	...	0.43
1845	46.4	+ 0.8	62.7	20.0	42.7	11	1.760	1	Inp.	...	...	0.26
1846	44.6	— 1.0	69.7	20.7	49.0	14	4.180	2	Inp.	...	...	0.44
1847	44.0	— 1.6	65.0	20.3	44.7	13	4.390	2	Inp.	...	...	0.19
1848	46.3	+ 0.7	62.2	26.4	35.8	11	1.550	0	0.0	N 54° W	1.24	4.60mls.
1849	45.3	— 0.3	59.2	25.5	33.7	13	5.965	1	Inp.	N 12° W	1.27	7.76
1850	45.4	— 0.2	66.6	24.8	41.8	10	2.085	0	0.0	N 66° W	1.10	5.30
1851	47.4	+ 1.8	66.1	25.0	41.1	10	1.680	2	0.3	S 72° W	1.06	4.39
1852	48.0	+ 2.4	70.7	29.8	40.9	12	5.280	0	0.0	N 5° E	1.19	4.47
1853	44.4	— 1.2	64.7	25.5	39.2	10	0.875	2	Inp.	S 88° W	1.74	4.77
1854	49.5	+ 3.9	74.2	29.8	44.4	15	1.495	3	Inp	N 45° W	1.52	4.57
1855	45.4	— 0.2	64.3	28.0	36.3	14	2.485	5	0.8	N 82° W	4.91	9.88
1856	45.3	— 0.3	70.1	23.3	46.8	10	0.875	2	0.1	N 76° W	2.15	6.07
1857	45.4	— 0.2	63.5	27.7	35.8	10	1.040	2	0.2	N 19° W	2.93	6.24
1858	48.8	+ 3.2	76.3	34.2	42.1	17	1.797	1	Inp.	N 34° W	0.36	5.96
1859	43.0	— 2.6	68.4	22.3	46.1	11	0.940	4	Inp.	N 68° W	5.04	8.12
1860	47.3	+ 1.7	63.7	28.4	35.3	15	1.618	1	Inp.	N 9° W	2.00	6.93
1861	48.7	+ 3.1	64.5	30.2	34.3	15	1.993	1	Inp.	N 61° W	1.06	5.96
1862	48.7	+ 3.1	76.0	27.0	49.0	19	2.684	2	0.5	N 78° W	2.89	6.53
1863	45.9	+ 0.3	63.4	30.9	32.5	16	2.522	0	0.0	S 71° W	0.48	6.16
1864	45.2	— 0.4	64.8	28.4	36.4	22	3.321	1	Inp.	N 60° W	3.17	6.66
Results to 1864.	45.65	...	66.67	25.79	40.88	12.6	2.530	1.8	0.78	N 60° W	1.74	6.14
Exc. for 1864.	— 0.48	...	— 1.87	+ 2.61	— 4.48	+ 9.4	+ 0.791	— 0.8	— 0.78	....	......	+ 0.52

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST,—NOVEMBER, 1864.

Latitude—43 *deg.* 39.4 *min. North. Longitude*—5 *h.* 17 *m.* 33 *s. West. Elevation above Lake Ontario,* 108 *feet.*

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resul't. Direction.	Velocity of Wind.					Rain in inches.	Snow in inches.
	6 A.M.	2 P.M.	10 P.M.	Mean.	6 A.M	2 P.M	10PM	ME'N		6 A.M.	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A. M.	2 P. M.	10 P. M.		6 AM.	2 PM.	10 P.M.	Re-sul't.	ME'N		
1	29.960	29.962	29.982	29.9718	° 34.9	° 40.7	° 30.2	° 34.83	° — 5.63	.131	.136	.142	.137	.65	.53	.84	.69	N	N W b N	N b W	° N 21 W	3.0	11.4	2.5	3.42	3.61	...	...
2	.958	.884	.827	.8872	29.1	39.2	37.8	35.53	— 4.73	.133	.164	.183	.164	.83	.67	.80	.79	N N W	S W b W	W b S	N 61 W	2.0	4.5	2.0	1.91	2.47	...	...
3	.718	.589	.336	.5280	34.9	39.6	39.9	38.30	— 1.70	.178	.150	.156	.162	.87	.61	.62	.69	N b W	S b E	E	S 87 E	3.0	6.5	14.6	8.35	9.32	.620	...
4	28.921	28.671	28.966	28.8670	40.7	38.5	34.2	37.78	— 1.98	.242	.208	.153	.202	.95	.89	.77	.87	E S E	N W	W N W	N 47 W	14.0	16.2	14.5	7.83	12.66	.225	Inp.
5	29.231	29.467	29.628	29.4680	29.5	33.4	27.7	29.73	— 9.75	.129	.112	.106	.115	.78	.58	.70	.70	N W	N W b W	W b S	N 63 W	16.6	18.0	1.2	8.29	8.76	...	Inp.
6	.622	.520	—	—	28.0	46.4	—	—	—	.124	.221	—	—	.81	.70	—	—	W S W	S	S E b E	S 10 E	3.0	9.6	5.5	5.89	7.69	.065	...
7	.595	.684	.789	.7032	42.8	52.6	40.7	45.30	+ 6.30	.250	.259	.231	.245	.90	.65	.91	.82	S W b W	S W b S	S W b S	S 33 W	5.7	8.5	3.2	6.10	6.12	...	...
8	.802	.631	.497	.6285	40.7	47.2	50.0	46.27	+ 7.58	.241	.287	.356	.295	.95	.89	.99	.93	S W b S	E	E N E	N 82 E	5.5	12.0	7.5	5.82	6.74	.705	...
9	.281	.103	28.888	.0832	54.0	56.5	55.8	55.13	+16.73	.412	.455	.389	.403	.99	.99	.87	.92	S b E	S	S W b S	S 35 W	7.0	9.6	18.4	14.01	14.80	.720	...
10	.088	.147	29.258	.1830	42.1	45.0	36.0	40.55	+ 2.47	.171	.117	.189	.155	.62	.36	.89	.62	S W b W	W S W	S W b W	S 60 W	22.0	25.0	16.5	20.17	20.23	...	...
11	.278	.296	.348	.3117	34.2	36.0	33.1	34.23	— 3.55	.168	.130	.167	147	.85	.61	.88	.75	S W b W	W S W	S W b W	S 72 W	12.5	14.0	8.0	10.11	10.25	...	...
12	.338	.366	.528	.4258	25.5	36.3	28.7	30.27	— 7.23	.125	.168	.101	.125	.91	.78	.63	.73	W S W	N b W	W N W	N 43 W	1.0	10.8	15.6	9.56	10.03	...	...
13	.586	.636	—	—	27.0	31.6	—	—	—	.115	.111	—	—	.77	.62	—	—	W N W	N W	W N W	N 52 W	7.0	13.0	9.5	9.02	9.08	...	Inp.
14	.876	.874	.826	.8592	21.9	32.4	30.2	28.22	— 8.68	.090	.109	.128	.111	.77	.58	.76	.71	N W b W	N W	Calm.	S 33 W	8.0	4.2	0.0	0.77	6.12	...	1.5
15	.614	.616	.877	.7107	27.3	30.6	29.5	29.18	— 7.32	.118	.131	.136	.129	.79	.76	.83	.80	E S E	N W	N W b W	N 14 W	12.5	15.8	4.0	3.18	5.96	...	3.0
16	30.027	30.062	.997	30.0277	23.7	35.6	33.4	31.82	— 4.38	.112	.149	.163	.146	.87	.72	.85	.81	N W b W	S	E b S	S 58 E	2.5	4.8	9.6	3.87	5.33	...	...
17	29.819	29.648	.661	29.7138	34.5	39.2	40.3	37.75	+ 1.95	.181	.233	.219	.204	.90	.97	.87	.90	E b S	E b S	W	S 87 W	2.0	3.2	7.0	3.27	5.50	.005	...
18	.778	.686	.785	.7543	29.8	41.7	33.4	34.80	— 0.68	.140	.148	.146	.147	.84	.56	.76	.73	W b N	W b S	S W b W	S 76 W	3.4	13.8	6.0	9.37	9.64	...	...
19	.805	.744	.630	.7210	29.1	38.9	36.0	34.53	— 0.55	.126	.151	.189	.155	.78	.63	.89	.77	W S W	S S W	S S W	S 26 W	1.0	8.8	3.8	3.97	4.20	...	...
20	.534	.410	—	—	29.8	41.0	—	—	—	.147	.158	—	—	.88	.60	—	—	S S W	S E	S S E	S 32 E	2.0	8.8	7.0	3.89	5.60	.035	...
21	.266	.290	.254	.2727	39.9	38.9	32.7	36.38	+ 2.00	.224	.135	.135	.159	.91	.57	.73	.73	S W b S	W S W	W b S	S 73 W	7.0	12.4	5.6	8.27	8.82	...	...
22	.222	.296	.364	.3065	30.6	29.1	27.0	28.47	— 5.62	.144	.084	.129	.115	.85	.50	.88	.73	W	W S W	W b S	S 80 W	12.5	13.0	12.6	13.00	13.28	...	Inp.
23	.528	.760	.941	.7677	21.9	26.6	24.8	24.48	— 9.18	.084	.091	.085	.087	.71	.62	.63	.66	W N W	N N W	W b S	N 57 W	7.2	14.0	6.6	6.32	6.99	...	Inp.
24	.981	.988	30.053	30.0147	25.5	31.3	32.0	30.68	— 2.58	.133	.115	.166	.143	.96	.65	.91	.83	W b S	W S W	S W	S 52 W	0.5	3.0	1.0	2.44	2.48	...	Inp.
25	30.108	30.070	29.976	30.0462	31.6	37.4	34.2	34.17	+ 1.20	.140	.135	.168	.149	.78	.60	.85	.76	Calm.	S S W	S b W	S 13 W	0.0	2.5	2.0	1.80	1.85	...	...
26	29.804	29.658	.601	29.6765	37.8	40.1	39.9	39.18	+ 6.62	.199	.221	.233	.219	.87	.89	.95	.91	S b W	S S W	S b E	S 8 W	4.5	5.6	5.5	4.91	5.31	.315	...
27	.610	.622	—	—	34.2	43.2	—	—	—	.185	.217	—	—	.93	.77	—	—	S W b W	N W	S W	S 56 W	4.4	2.0	3.5	1.27	3.22	...	...
28	.544	.308	.297	.3730	37.8	45.4	48.0	44.42	+12.53	.217	.283	.330	.284	.95	.93	.98	.96	E	E	S W	S 16 E	6.5	1.8	3.5	2.25	4.65	1.020	...
29	.228	.160	.227	.2053	48.6	56.2	48.2	50.58	+19.08	.337	.384	.317	.343	.98	.85	.94	.93	S W b S	S W	S W	S 45 W	3.2	7.5	3.6	5.22	5.31	.055	...
30	.360	.543	.689	.5480	51.5	51.5	40.3	46.92	+15.83	.254	.164	.166	.195	.66	.42	.66	.61	W b S	W b N	W S W	S 86 W	16.0	21.8	5.0	12.98	13.12	Inp.	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
M	29.5819	29.5578	29.5856	29.5790	34.61	40.00	36.31	36.91	+ 0.76	.180	.181	.188	.182	.84	.69	.82	.78	....	....	....	....	6.52	10.07	6.84	......	7.64	3.765	4.5

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR NOVEMBER, 1864.

NOTE.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely, at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer . . . . 30.126 at 8 a.m. on 25th. } Monthly range=
Lowest Barometer . . . . 28.671 at 2 p.m. on 4th. } 1.455 inches.
Self-registering Ther.
Maximum temperature . . . . 60°2 on p.m. of 9th } Monthly range=
Minimum temperature . . . . 21°0 on a.m. of 24th } 39°2
Mean maximum temperature . . 42°85 } Mean daily range=11°53
Mean minimum temperature . . 31°31 }
Greatest daily range . . . . 24°2 from a. m. to p. m. of 6th.
Least daily range . . . . 3°4 from a. m. to p. m. of 22nd.
Warmest day . . . 9th...Mean Temperature . . . 55°13 } Difference=30°.65
Coldest day . . . . 23rd...Mean Temperature . . . 24°48 }
Maximum { Solar (Vacuum) . . . . 98°0 on p. m of 7th } Monthly range=
Radiation { Terrestrial . . . . 12°0 on a. m. of 24th } 86°.0
Aurora observed on 1 night, viz.:—on 19th.
Possible to see Aurora on 9 nights; impossible on 21 nights.
Raining on 11 days; depth 3.765 inches; duration of fall, 91.7 hours.
Snowing on 8 days; depth 4.5 inches; duration of fall, 13.0 hours.
Mean of cloudiness=0.75; above average, +.01. Most cloudy hour observed, 8 a.m; mean=0.80; least cloudy hour observed, 10 p.m.; mean=0.70.

Sums of the components of the Atmospheric Current, expressed in Miles.

North.	South.	East.	West.
968.32	1811.19	817.94	3435.69

Resultant direction, S. 72° W.; Resultant Velocity, 3.82 miles per hour.
Mean velocity 7.64 miles per hour.
Maximum velocity 40.2 miles, from 1 to 2 a.m. on 10th.
Most windy day 10th—Mean velocity 20.23 miles per hour. } Difference 18.38.
Least windy day 25th—Mean velocity 1.85 miles per hour. }
Most windy hour, 1 to 2 p.m.—Mean velocity, 10.48 miles per hour. } Difference
Least windy hour, 4 to 5 a.m.—Mean velocity, 6.16 miles per hour. } 4.32 miles.

7th. Lunar halo 10 p.m.

8th. Dense fog from 4 p.m.
9th. Dense fog till 2.40 p.m.
16th. Lunar halo 8 p.m. to midnight.
17th. Dense fog 8 a.m. till 3 p.m.
19th. Auroral light and streamers, 7 to 9.20 p.m.
21st and 25th. Solar halo 2 p.m.
27th. Ground fog, 7 to 8 p.m.
28th. Fog at 10 p.m. and midnight.
29th. Fog till 9 a.m. Sheet lightning 7 to 10 p.m.

The month of November, 1864, was comparatively mild, wet, windy, and cloudy.

COMPARATIVE TABLE FOR NOVEMBER.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above Average (45°5).	Maximum observed.	Minimum observed.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant. Direction.	Resultant. Velocity.	Mean Force or Velocity
1840	35.9	— 0.8	54.4	20.5	33.9	5	1.220	8	...	...	...	...
1841	35.0	— 1.7	63.2	7.6	55.6	8	2.450	5	...	...	...	0.91 lbs
1842	33.3	— 3.4	50.6	7.6	43.0	9	5.310	10	...	...	...	1.22 "
1843	33.5	— 3.2	51.2	14.4	36.8	10	4.765	7	1.2	...	...	0.59 "
1844	34.9	— 1.8	49.8	12.0	37.8	8	Imp.	4	8.0	...	...	0.48 "
1845	36.8	+ 0.1	58.8	7.6	51.2	7	1.105	4	5.0	...	...	0.53 "
1846	41.3	+ 4.6	55.5	18.2	37.3	12	5.805	2	0.4	...	...	0.64 "
1847	38.6	+ 1.9	58.2	7.8	50.4	14	3.155	3	Inp.	...	...	0.36 "
1848	34.5	— 2.2	49.3	16.5	32.8	9	2.020	3	1.4	N 81 W	1.81	4.81 ms
1849	42 6	+ 5.9	56.7	28.4	28.3	10	2.815	2	1.0	N 39 W	1.55	4.78 "
1850	38.8	+ 2.1	62.3	18.1	44.2	7	2.955	1	Inp.	N 42 W	1.43	5.27 "
1851	32.9	— 3.8	50.1	16.5	33.6	5	3.885	6	6.7	N 50 W	1.25	4.70 "
1852	36.0	— 0.7	50.4	18.7	31.7	7	1.775	3	2.0	N 59 W	1.53	6.50 "
1853	38.7	+ 2.0	54.1	14.4	39.7	15	2.425	6	2.7	N 9 W	0.55	5.52 "
1854	36.8	+ 0.1	54.9	15.1	39.8	13	1.115	4	1.3	W	3.44	7.54 "
1855	38.6	+ 1.9	54.1	18.7	35.4	8	4.590	6	3.0	N 66 W	3.18	10.81 "
1856	37.4	+ 0.7	56.4	22.8	33.6	10	1.375	9	9.5	S 85 W	2.95	8.75 "
1857	33.5	— 3.2	57.8	—2.3	60.1	14	3.235	9	6.9	S 61 W	5.45	9.25 "
1858	34.2	— 2.5	52.0	20.5	31.5	12	3.879	13	4.0	N 25 W	3.14	8.87 "
1859	38.9	+ 2.2	61.0	24.1	36.9	12	5.193	9	0.6	N 81 W	3.39	9.65 "
1860	37.9	+ 1.2	62.7	14.0	48.7	12	2.569	8	1.9	S 89 W	4.95	11.02 "
1861	37.1	+ 0.4	51.5	25.1	26.4	14	4.294	8	3.2	N 46 W	1.94	7.44 "
1862	35.6	— 1.1	58.0	17.2	40.8	11	2.205	11	5.3	N 46 W	3.00	6.60 "
1863	39.1	+ 2.4	57.6	19.4	38.2	13	3.656	6	0.1	N 88 W	3.50	7.86 "
1864	36.9	+ 0.2	56.5	21.9	34.6	11	3.765	8	4.5	S 72 W	3.82	7.64 "
Results to 1864.	36.75	...	55.48	16.19	39.29	10.2	3.148	6.2	3.12	N 78 W	2.43	7.47
Exc. for 1864.	+0.16	...	—1.02	—5.71	—4.69	+ 0.8	+ 0.617	+ 1.8	+ 1.38	...	...	+0.17

AMERICAN ASSOCIATION FOR THE [illegible] OF SCIENCE

THE

CANADIAN JOURNAL

OF

INDUSTRY, SCIENCE, AND ART:

CONDUCTED BY

THE EDITING COMMITTEE OF THE CANADIAN INSTITUTE.

NEW SERIES. No. LVI.

CANADIAN INSTITUTE
ESTABLISHED 1849

SMITHSONIAN INSTITUTION
MAY 28 1910
NATIONAL MUSEUM

MARCH, 1865.

TORONTO:
PRINTED FOR THE CANADIAN INSTITUTE,
BY LOVELL AND GIBSON, YONGE STREET.

CANADIAN INSTITUTE.

EDITING COMMITTEE.

GENERAL EDITOR - - Rev. WM. HINCKS, F.L.S.

I. *Geology and Mineralogy:* E. J. Chapman, Ph.D., Prof. of Geology and Mineralogy, Univ. Coll. Toronto.

II. *Physiology and Natural History:* Rev. Wm. Hincks, F.L.S., Prof. of Natural History, Univ. Coll., Toronto.

III. *Ethnology and Archæology:* Daniel Wilson, LL. D., Prof. of History and English Literature, Univ. Coll., Toronto.

IV. *Meteorology:* G. T. Kingston, M.A., Director of the Magnetic Observatory, Toronto.

V. *Chemistry:* Henry Croft, D. C. L., Prof. of Chemistry and Experimental Philosophy, Univ. Coll., Toronto.

VI. *Mathematics and Natural Philosophy:* J. B. Cherriman, M. A., Prof. of Natural Philosophy, Univ. Coll., Toronto; and the Rev. G. C. Irving, M.A., Prof. of Mathematics, Trin. Coll., Toronto.

VII. *Engineering and Architecture:* Sandford Fleming, C. E.

VIII. *Philology:* Rev. E. Hatch, B.A., Prof. of Classics, Morin Coll., Quebec.

The Canadian Journal is printed exclusively for gratuitous distribution among the Members of the Canadian Institute, and such Institutions and Societies as the Council may determine; but Members may purchase extra copies at 2s. 6d. per number, and Provincial Literary and Scientific Societies may obtain the Journal at the same rate, by an annual payment in advance.

⁂ *Communications for the Journal to be addressed to the General Editor,* Prof. Hincks, *Univ. Coll., Toronto. Communications on general business of the Institute, to be addressed to* U. Ogden, *Esq., M.D., Corresponding Secretary, or to Mr. Jas. Johnson, Assistant Secretary, Canadian Institute, Toronto.*

☞ Mr. Edward Allen, 12, Tavistock Road, Covent Garden, London, W, has been appointed the English Agent for the Institute. All European communications are requested to be forwarded through him.

THE CANADIAN JOURNAL.

NEW SERIES.

No. LVI.—MARCH, 1865.

THE PRESIDENT'S ADDRESS.

BY THE HON. VICE-CHANCELLOR MOWAT.

Read before the Institute, 21*st January,* 1865.

Gentlemen of the Canadian Institute:

I feel deeply the great honor you have done me in asking me to become your President. The honor was a most unexpected one, and I confess it was not without some feeling of dismay that I learned that your choice had fallen upon me. I knew well the value of your Association, having, indeed, been a member of the Institute almost ever since its establishment; but the learning with which my busy life has made me familiar is not the learning which you cultivate; the sciences which I have made a special study, and the arts with which I have had to deal, are not the Sciences or the Arts to which, under your Charter, your attention is restricted. But the choice of me for your President is not my act, but your own: and I feel that it would be unbecoming and ungracious of me to decline the position amongst you which it is your wish, for some reason or other, that for the present year I should occupy.

Your Institute has two objects in view. First and principally, you desire to do something for the advancement of Science. You have done something for it, and will, I doubt not, yet do more. You number amongst your members some who have already a European reputation; and many of the papers which have been read and discussed at your meetings have been deemed worthy of publication in some of the leading scientific journals of Europe. Your own Journal, in which such papers first appear, has already attained distinction among periodicals of the same character.

But you have had it also in view to induce a more general attention amongst the Canadian people to the objects of Science; and, in the observations I am to make upon this occasion, I am sure that I shall have your indulgence, though I should chiefly keep in mind this part of your design, and though I should speak from the stand-point of a politician and a public man—a character which it is but a few weeks since I ceased to fill, rather than profess to speak from the stand-point of a man of science—a character to which I do not venture to make any pretension.

The worth of the Canadian Institute has not been altogether unrecognized in the Councils of the Province. Parliament has for many years been in the habit of making to it an annual grant. Our country is under popular government, and the mass of electors, or indeed of their representatives, make no claim to science; and it is therefore gratifying to know that to some extent they appreciate the value of scientific pursuits. Our fellow Canadians are almost all engaged, as in a new country like this almost all must be engaged, in the struggle to obtain for themselves and their families the means of subsistence, or to add to these some of the comforts of life. Yet they have certainly shewn some ability to recognize, and some disposition to encourage, pursuits entirely foreign to their own, and of which, therefore, it always needs a considerable amount of intelligence to perceive the claims or the utility. This disposition will, I trust, gradually increase; but that it now exists to the extent it does, is a fact of peculiar interest in view of the work which our statesmen are at this moment engaged in, of laying the foundations of a nation of which Canada will long be, and will perhaps always be, the most important portion: a nation, though still receiving, and wishing to receive, its Chief Magistrate from the sovereign of the Fatherland: a nation, though still cordially recognising the supremacy of the Imperial Parliament: a nation, not independent of any other, but continuing, and preferring to continue, part of the country from which we have sprung; of the country whose language we speak; whose institutions we adopt or imitate; whose history is our own; and which, in science and literature, in freedom and power and wealth, in the purity of its statesmen of all parties, and in the patriotism and morality of its people, has long been regarded as second to no nation of any age. This England, with which the Canadian people desire a perpetual connexion, is greater and better, and more to be respected, imitated and loved, than the England of a century ago to which the American colonies of that day gave many proofs of deep attachment. She treats her colonies, too, with a generous consideration and a wisdom then unknown: and while the desirableness of continued connexion with the old land, has, in consequence, greatly increased, the distance between Britain and America, which was, formerly, one great difficulty in the way of long-continued connexion, has, through the progress since made in scientific knowledge, ceased to be any difficulty. Steam has brought us nearer, for all practical purposes, to the Motherland, than, at the period referred to, some portions of the British Islands were to each other; and for part of one ever memorable day, the 5th August, 1858, science accomplished even more than this; for, on that day, so far as relates to mutual communication, it annihilated all distance between us; and now we have again the gladdening news that a new atlantic cable is nearly completed, and probably will, before the year expires, renew the magic connexion between the old world and the new, never again to be broken.

In view of the contemplated union I have referred to, the men of Canada are daily reminding one another that we shall start on our new career with a population of nearly four millions: and that the increase of our population has always been, and is likely to continue, in a ratio far exceeding that of which European nations have had any experience. Our fellow subjects to whom the subject is interesting, (and to whom is it not interesting?) are calling to mind, that, in this population, there are half a million and more of able-bodied men between the ages of 20 and 45 to defend our country and our homes, from foreign aggression. They are referring to our vast grain fields, our extensive timber lands, our invaluable fisheries, our gold and copper mines, and our other yet almost undisturbed mineral deposits. They are reckoning up that the confederation, without taking into account the great North West, will embrace thirteen millions of acres of cultivated land; thirty millions of uncultivated in the hands of private owners; and many millions more that are still in the hands of the Government; that the exports of fish alone will amount to ten millions of dollars; that a year's produce of its fields and gardens will be worth one hundred and fifty millions; that the present assessed value of the farms within its territory is upwards of five hundred millions; and that the real value probably upwards of half as much more. But to the present provinces, with all these vast resources and all this great wealth, our statesmen are hoping soon to add the great North West, with its rich expanses of fertile prairies, and its treasures of gold, and iron, and coal, and salt; and are reminding us that this North West Territory contains more land suited for the permanent abode of men than Canada itself does; and that, including this territory, our British American Nation will be capable of supporting a population more than double that of the British Islands. It is remembered, also, that it is across the territory of this British American Nation there is to be found the shortest and cheapest route for the great railway which must one day be built to connect the Pacific with the Atlantic. Our politicians are calling to mind that the climate and soil of all these territories are precisely those by which the skill and energy and endurance of the human race are best developed; that here thought and labor are the conditions of man's existence, but yield abundant rewards whenever they are faithfully bestowed. In view of all these facts, the Canadian people feel that the elements of Empire are here; and so they are. But in the great scheme thus absorbing the public mind in British North America, are there no points which Science touches, and which may without impropriety be alluded to in this assembly of the learned? I think there are. For the prospect before us increases immensely the importance of every agency that is fitted to advance the reputation or to mould the character of the people of this new nation; and I look on the Canadian Institute, and the objects it has in view, as having a very close connexion with both our reputation and our future character as a people.

It is to be remembered, for example, that in connexion with the continuance of British supremacy, the contemplated scheme also involves an extension of power in some respects to the Canadian people. Our present institutions are popular institutions. For more than a score of years our people have been accustomed to self-government. Their local municipal affairs in town and country are in their own hands; and their municipal councils have larger powers than those of

Great Britain. Once every year the people choose anew who shall exercise for them these powers; every township by itself; every county by itself; every village; every town; and every city. Almost every one who rents a cottage or owns a shanty has a vote in the selection. The whole land is divided, too, into common school sections; and the school trustees of every section are also the nominees of the people. Both houses of Parliament have a similar origin, though longer terms of office. The power thus already possessed by the people has sometimes been used well and sometimes ill, as all power is, by whomsoever held, and as power in the hands of imperfect men always must be. But it is satisfactory to perceive some of the past results of popular power in our country. What for example has been done for education? What appreciation has been shown of higher learning? What recognition has there been of the claims of science? All these things interest us as members of the Canadian Institute; and the answers to such inquiries are not discouraging.

The position and character of our public schools, the attendance at them, the amount raised annually by voluntary taxation for their support—all have been increasing in a greater proportion than our population or our wealth. We have in Upper Canada one magnificent University, endowed by the public and open to all. We have several denominational colleges of most respectable character, some, if not all of them, open also to every one; and supported, either wholly or chiefly, by the voluntary contributions of the people of the various religious denominations with which they are connected.

To go a little more into detail, I would remind you that over and above the endowment out of which the Provincial University and the Upper Canada College are maintained; and over and above the Grammar School fund in Upper Canada; and the endowments of the Universities and Colleges of Lower Canada, and of the denominational colleges of Upper Canada; that over and above all these, the grants made by the Canadian Parliament for the year ending 30th June, 1864, for common and superior education, amounted to upwards of $300,000; and that in Upper Canada that portion of this sum which goes there to Common Schools and Grammar Schools, was supplemented from local sources, chiefly by self imposed taxes on the school sections and municipalities, by an amount equal to five times the Government grant, making the public expenditure for the year, in Upper Canada alone, for Public Grammar Schools and Common Schools, to exceed a million and a half of dollars.

The grants to other literary and scientific institutions amounted to $14,800; of which $750 went to you, $4,800 to the Provincial Observatory here, $2,400 to the Observatory at Quebec, $500 to that at Kingston, and $500 to that at Isle Jesus. I may observe, also, in connexion with these grants to Observatories, that the Legislature has made provision for records being kept of meteorological observations in every county through means of the grammar school teachers.

The Provincial Observatory at Toronto was established by the British Government twenty-five years ago, as one part of a scheme which has been admiringly characterised by high authority as "the most gigantic scientific enterprise that had ever been conceived." The scheme was organized by the British Government through the united influence of the British Association and the Royal Society; but other European nations immediately took an active part in it. To carry it out, Magnetic Observatories were simultaneously established by governmental authority, at an enormous but not useless expense, at many points in Europe and America; and the number of well endowed Meteorological Observatories throughout the world has greatly increased since. Some years ago the Observatory here was assumed and amply endowed by the Canadian Government, and substantial buildings were erected for its use. The very great value of the observations made here has received the emphatic and repeated testimony of the highest scientific authorities of other countries, as well as of our own. I refer to this matter with all the greater interest because the advantages which the Observatory contemplated were not local or even immediate. It is only in connexion with observations elsewhere that those made here are very important; and whatever benefit they afford, other countries must partake of quite as much as Canada can; and it is even future generations, rather than our own age, that may reap their principal fruits.

So, again, I ought to refer to the Geological Survey of the country; for both our Geological Survey and our Provincial Magnetic Observatory are named with satisfaction wherever science is cultivated and knowledge esteemed. The Survey was instituted by the Provincial Government soon after the union of Upper and Lower Canada, and has been carried on steadily ever since. By the act first passed on the subject, the sum of $10,000 annually, for five years, was set apart for the purpose of the survey. At the end of these five years, the act was renewed for a like period. In 1856, the sum theretofore appropriated having (as another act, passed in that year, declared,) been found insufficient to carry out the survey in an effectual manner, and it being deemed by Parliament to be desirable that such an increase should be made to the establishment as would hasten the completion of the undertaking and enlarge its usefulness, the annual appropriation was raised to $20,000, and was continued for five years more. In 1864, annual grants of varying amounts having been made during the three intervening years, Sir William Logan represented to the Government of the day the advantages that would result from being saved the necessity of making an annual appeal to Parliament; and I had, with other members of the Opposition, the pleasure, in the last session of my parliamentary life, of supporting a vote, recommended by the Government, of $20,000 a year for a further period of five years from the 1st of January 1864.

Besides the direct and obvious practical advantages which this survey has yielded to the Province, it has done much to make the name of Canada familiar to men of science in Europe; and it has also served to advance geological science itself. Not to multiply the evidences of this, with which many of you are so familiar, I venture to read here the reference to the subject which was made by Sir Charles Lyell, the President of the British Association for the advancement of science, at the last meeting of that learned body.

Sir Charles refers to two points on which a gradual change of opinion had taken place among geologists of late years; and after disposing of the first of these two points he proceeds to say:

"In reference to the other great question, or the earliest date of vital phenomena on this planet, the late discoveries in Canada have at least demonstrated that certain theories founded in Europe on mere negative evidence were altogether delusive. In the course of a geological survey, carried on under the able direction of Sir William E. Logan, it has been shown that, northward of the River St. Lawrence, there is a vast series of stratified and crystalline rocks of gneiss, micaschist, quartzite, and limestone, about 40,000 feet in thickness, which have been called Laurentian. They are more ancient than the oldest fossiliferous strata of Europe, or those to which the term primordial had been rashly assigned. In the first place, the newest part of this great crystalline series is unconformable to the ancient fossiliferous or so called primordial rocks which overlie it; so that it must have undergone disturbing movements before the latter or primordial set were formed. Then again the other half of the Laurentian series is unconformable to the newer portion of the same. It is in the lowest and most ancient system of crystalline strata that a limestone about a thousand feet thick has been observed, containing organic remains. These fossils have been examined by Dr. Dawson, of Montreal, and he has detected in them, by the aid of the microscope, the distinct structure of a large species of Rhizopod. Fine specimens of this fossil called *Eozoon Canadense*, have been brought to Bath by Sir William Logan, to be exhibited to the members of the Association. We have every reason to suppose that the rocks in which these animal remains are included are of as old a date as any of the formations named Azoic in Europe, if not older; so that they preceded in date rocks once supposed to have been formed before any organic beings had been created."

While the Canadian people of all parties are contemplating with satisfaction the formation of a peaceful union of the British American Provinces, it is impossible not to think of the unhappy war which has for some years been dividing the States which lie south of us. At the time of their final separation from Great Britain, the population of the old American Colonies did not differ much from that which our Confederation would have at its formation. Considerably less than a century has since passed; and yet, in this dreadful contest, the Northern and Southern States, together, have raised, and have year after year kept in the field, contending armies which have seldom been paralleled amongst the oldest and most warlike nations of Europe; and have expended in the war more money than was probably ever expended in war by any country in the same space of time before; and the greater part of the enormous expenditure has been accomplished without loans from any foreign country.

This unhappy contest has served to direct an unusual amount of attention on the part of men of scientific skill and energy, both in Europe and America, to the improvement of the various means of attack and defence which war calls forth. The war of the Crimea had directed special attention to the subject, and the American civil war has given to it renewed interest. Larger guns have accordingly come into use than were thought desirable formerly; and larger still will probably before long be employed. We hear also of the contending claims of Armstrong guns and Whitworth guns, and of gunpowder and gun cotton. Renewed and extensive experiments have been made under the superintendence or with the aid of men of the highest scientific skill in regard to the power of projectiles, on the one hand; and to new models for ships of war, and new defensive armour for ships, on the other. In regard to defensive armour, the conclusion, on the whole, seems to be, that no ships can be made to carry plates sufficient to withstand the new guns; and that it would probably be better to have no plates at all. While the smashing power of the new guns is found to be so enormous, these guns at the same time, in regard to range and precision, so far exceed all previous experience that, I observe, one very distinguished officer declared, in reference to them, that there was nothing in the Arabian Nights so wonderful; while His Royal Highness the Commander in Chief affirmed of the Armstrong guns, that they could do anything but speak.

There is, I think, an impression amongst unscientific men that the idea of substituting the use of guncotton for gunpowder for military purposes has been entirely abandoned. The official reports published in France were indeed very unfavourable to it; but their conclusions have by no means been acquiesced in. The experiments made by the Austrian Government, during a course of twelve years, had given results highly favourable to the use of guncotton, and, at the suggestion of the British Scientific Association, the British Government, in July, 1864, appointed a committee to investigate the subject in all its bearings, with General Sabine as President, and with a membership representing the army, navy and military, as well as civil engineering, and chemical and physical science.

The experiments which have been made under the auspices of this committee, during the last year, are said to have established (in accordance with the results of the Austrian experiments,) that guncotton possesses great superiority over gunpowder in both the simplicity and the safety of its manufacture; and to have indicated that the changes to which guncotton is liable, under conditions like those under which it would be used or preserved for military purposes, are very minute, and such as are not likely to interfere with its employment for these purposes. Again, guncotton used in musketry has not the disadvantage of fouling the gun; it has much less recoil, though the effect is the same; one third of the charge is the equivalent proportion as compared with gunpowder; and guncotton does not heat the gun. The ultimate substitution of guncotton for gunpowder, for military and most other purposes, thus appears to be quite possible.

In view of all these improvements in destructive warfare, it is satisfactory to remember that, as instruments of war become more destructive, experience hitherto has shown that wars become less frequent, are of briefer duration when they do take place, and lead to less loss of life in a generation, than when less effective means of warfare are employed.

An appreciation of the practical part of science may well be expected amongst a cultivated people. Its value in time of war, or in promoting the useful arts in time of peace, is not at all likely to be overlooked. So far as it is perceived to effect improvements in what ministers to the wants of men, science is pretty sure of attention. Indeed every day and almost every hour of our lives, we are reminded of the services which practical science has rendered in making life easy, and in promoting in every way our physical well-being. The additions made, directly and indirectly, to the wealth and comforts, the convenience and pleasures, of civilised countries, by the steam engine, the railway, and the electric telegraph, and by the numberless machines and contrivances of which scientific knowledge has led to the construction, are too obvious to escape the observation of any. Who could fail to recognise the value of the knowledge which serves to convert some raw material in nature to human use? or which serves to contrive a new machine that saves labor? or a new instrument that diminishes the cost of production? or a new method of any kind which leads by a shorter road to wealth?

On the other hand, that part of human knowledge, the application of which is either unknown or very remote, is less apt to receive attention, and less apt to be duly appreciated, than the other. This doubtless ought not to be so. Reason and experience alike shew that what seems more practical cannot long prosper if it be severed from what is more theoretical and abstract; what is speculative to-day becomes practical to-morrow; what is merely curious when first perceived or discovered, is afterwards found, not only to be wonderful to contemplate or know, but also to be in the highest degree useful in its applications. When the attractive power of magnetic substances was first noticed, who foresaw that there would grow out of it the construction of an instrument which would enable vessels to be steered on the high seas with confidence and safety on the darkest night, and that, by means of such an instrument, transportation would be so facilitated that an enormous influence would thereby be exercised on the condition of the world? or who foresaw that the same strange power would lead to the wondrous telegraph line, and to the conveyance of men's thoughts by its instrumentality with the speed of lightning from one end of the earth to the other?

If, therefore, the peculiar condition of society amongst us, or any other cause, leads to the neglect of the higher sciences, an important office is performed by those who do what can be done to counteract this tendency; to foster the love of science on its own account, and apart from the effort to utilise it or from the immediate expectation of utilising it; and to thus encourage scientific studies for their own sake, though by no means neglecting the practical application of them.

There are certainly circumstances connected with our past and present condition which give a special interest to all such agencies, and I have touched upon them already. I refer particularly to the fact that our whole people is engaged in active life. We have no leisure class. Our country affords facilities unknown to the old world for any man of energy and industry to make or increase his fortune; and almost all are occupied with the work of obtaining or securing the means of subsistence or comfort. Again, the highest positions are open to every one who aspires to them; lowly origin or early poverty is no barrier. The consequence is, that those who are not absorbed in the pursuit of wealth or of physical gratification, aspire to power. The tendency of all this is to confine the labors of the intellect to these objects; and I recognise in the Canadian Institute, an important agency towards counteracting this tendency, so far as the influence of the Institute and the influence of its publications extend; and of directing to scientific pursuits the intellectual energy of some of those who have an aptitude for such pursuits, but might otherwise never cultivate them.

I rejoice also at the success which has attended this society hitherto, because there is so much in Nature yet to be observed and discovered and investigated. The great work requires every agent that can be pressed into the service, and it is the plain duty of every civilised people to take an active part in the work. The progress of science hitherto has been wonderful; and yet it has but served to make it more clear than ever that the unknown and yet knowable far exceeds in extent and importance the known. The field of investigation to which you give attention, embraces, amongst other subjects, the wonders and laws of the heavens; geology; ethnography; natural history; the affinities of the natural properties of bodies; magnetism, galvanism, and electricity; light and heat; the combination and application of the mechanical powers; the use of steam; the analysis of mineral products, and of liquid and aeriform fluids; and the application of science to improvements in the arts. In this vast field there is assuredly room enough for many additional workers for ages to come.

Again, I am interested in the success of the Canadian Institute, because I desire that my country, whether it is to consist of Canada only, or of all British North America as I hope it soon will, should not be behind the nations of the world in furnishing workers in the field of science; in taking part in the advancement of human knowledge; in contributing to the enlargement of the empire of mind. Must it not be the wish of every lover of his country that we should not be satisfied with possessing ourselves of the learning of other lands, but should add some truths contributed by men of science among ourselves? Must not every man of any patriotic spirit desire to see our land an object of interest to other lands, not only for the prosperity of our people and the comforts with which industry surrounds them; not only for the farseeing wisdom and the patriotism of our statesmen, or for the learning and purity of our judges; not only for the general intelligence of our Canadian fellow subjects—most important as all these objects assuredly are—but in addition to them all, who would not wish to see his country an object of increased interest to men of science too, to men who, in other lands, are engaged in the investigation of nature's laws and in the discovery of new truths? What Canadian of enlightened mind does not long to know that we are giving to such men increasing proofs of our appreciation of their high pursuits; and are giving them yearly increasing aid in the great work of investigating the hidden truths of nature? The reputation of our country would by such means be elevated in the world of thinkers; and these are the world's true, though it may be unrecognised, rulers.

I feel an interest in your researches into nature's truths, because while the subjects which occupy your attention, may now interest but few, they gradually make their way into the general mind of the people, and thus tend to raise the universal standard of attainment amongst us; securing to the people the advantage, which can hardly be exaggerated, of knowing the important truths you are occupied with; and enabling the legislature and the government of the land, from time to time, to recognise with increased distinctness the claims of science, as an important element of a nation's strength and prosperity.

I rejoice at your progress hitherto, because no pursuits can be better calculated than those which you foster, to inspire men with the love of what is true. For is it not truth that you are constantly in quest of? Is it not in their truth that the whole value lies of every new fact that is observed and published, of every new hypothesis that is suggested, of every new theory that is announced? The most splendid visions of the fancy you reject, if there is no truth in them. The coin, however bright and glittering, you put aside, if it is counterfeit. It is God's truth that you want to discover; it is God's laws that you are desirous of knowing, as these are manifested in the works He has created; and these laws you have found to well repay your search, for they are always more brilliant and marvellous than the loftiest visions of human imagination.

I rejoice at your prosperity, because the influence of the pursuits you cultivate is in opposition alike to indolence and to vice. They operate as a counterpoise to the stimulus of sense and appetite. They have a moral as well as an intellectual value. They raise the moral character as well as improve the mental faculties. The new world of ideas which they present, the new views of the relations of things, the astonishing secrets of the physical properties and mechanical powers which they disclose, present attractions well calculated, as far as such studies are appreciated and earnestly pursued, to exalt the standard of character in our country.

Who, again, can be familiar with even some of the results of scientific research, and his mind not be expanded, or his reverence for the God of nature, who is also the God of revelation, not be increased? Who can ponder, for instance, on the wonderful truths which the investigations of geologists and astronomers have made known, without having some more distinct notion of the Immensity, and Wisdom, and Power, of the Great Creator?

When we find men able to read in the very rocks something of the history of our earth for millions of years before man was created; able to read there something of the changes of land and sea, and of climate, which our earth then passed through; what strange plants grew; what strange animals lived and flourished; when we learn the evidence which patient investigation has made it possible to accumulate shewing that over every part of the earth's surface, in every class of organic life, whole series of created forms have been changed many times; and that the whole human period is but a unit in the vast sum of time that is past; when we find how much of our earth's old history has in this way become known; when we learn the possibility that telescopic observations may enable us to know more of it even from the other planets of our system, as Saturn, Jupiter and Mars unfold conditions not now terrestrial, and the moon other conditions which perhaps await the earth; when we read the assurances of the learned that within the limits of our solar system countless comets, the gipsies of the skies, are running their vagrant course; when we learn that our sun itself is not fixed in space, but is constantly moving forward with a velocity it is supposed of 18,000 miles an hour, carrying with it its whole planetary and cometary system; that many millions of stars are distributed throughout space; that important truths in regard to their very substance are now known to us; that probably every star is the centre of a system as vast as our own; that all these systems probably travel through space as our own solar system is doing; that the whole universe is thus in a perpetual state of motion through boundless space; and when we learn that these stupendous marvels are thought to be, or are felt to be, but glimpses of the unknown and unimagined reality—who does not feel his soul lost in gratitude to God that He has made us capable of learning so much of His mighty works, and in praise and wonder as he reflects on the Majesty of Him from whom all these works received their being and their laws, and who sits on the throne of the Heavens beholding, maintaining, and governing them all?

But I have occupied your attention too long. Let me say in conclusion, that whether we regard the practical utility of scientific pursuits; their moral tendency; the influence of such pursuits in promoting the intellectual progress of a people, and in raising them in the scale of human beings; the strength and prosperity and glory which science bestows on every nation that is alive to its value; the great services rendered to mankind by every conquest within the domain of truth; or, in a word, the important part science fulfils in promoting in a thousand ways the happiness and well-being of our race—abundant reason appears for parliament and people, for men of all ranks and degrees in the country, to do all that in their several places they can do to promote the great and interesting and important objects which your Institute has in view; and I most earnestly pray that the success you have had in the past may but symbolise the much greater success which awaits your high pursuits in the future.

NOTES ON LATIN INSCRIPTIONS FOUND IN BRITAIN.

PART XI.

BY THE REV. JOHN M^cCAUL, LL.D.,

PRESIDENT OF UNIVERSITY COLLEGE, TORONTO, ETC.

65. The letters D.M. are commonly used, as is well known, for *Diis Manibus*, and usually commence a funereal inscription. So general was their use in this sense, that they are found even in Christian Epitaphs,* inadvertently placed there without reference to their ori-

---

* This seems the simplest explanation of this anomaly. Perhaps grave-stones were kept ready for sale, having D. M. inscribed on them. See Orelli, n. 4223. Fabretti, p. 112, proposed *Deo Magno* or *Maximo*, as the expansion in such cases, whilst Mabillon, p. 75, with whom Morcelli, *Stil.* ii. 71, seems to agree, regards this use of D. M. as indicating that in the early ages, some of the less informed Christians retained a portion of the Pagan superstitions. Mr. Burgon, *Letters from Rome*, p. 213, remarks on this subject: "We begin 'To the memory,' which is quite the Heathen fashion. We talk (in poetry) of the 'urn,' the 'ashes of the dead,' the 'shade,' and so forth, without at all meaning it. Urns, and hour-glasses, and baby-heads with wings, and a weeping willow, and ladies leaning against broken columns, are not by any means symbolical of our actual belief or practice."

ginal meaning. They are also, in my judgment, used in a different sense, *viz.*, for *Deabus Matribus*. Of this, there are, I think, two examples in inscriptions found in Britain. The first, to which I shall call attention, is thus given by Horsley, *Durham*, n. xxxii :—

D M
CONDATI
ATTONIVS
QVINTIANVS
MENEXCCIMP
EXIV.S·SOLL·A

He expands a portion of it thus ; *Dis Manibus Condati Attonius Quintianus* * * * * * * *ex jussu susceptum solvit libenti animo.*

The following are his remarks :—

" This stone was found near Piercebridge, not far from Watling street. It has been published by Mr. Thoresby, as also in the later editions of Camden, and is inserted by Dr. Gale in his *Antonini Itinerarium.* It is a funeral monument erected to one Condatus, in the usual tenour of such inscriptions. I wonder, therefore that not only Mr. Thoresby, but also the learned and judicious Dr. Gale should take it for the name of a place, which does not use to be inserted in this kind of inscriptions; and that they should suspect it to be the *Condate* in the Itinerary, which by all circumstances appears to be in Cheshire. As *Condatus* is the name of the deceased, so *Attonius Quintianus* are the two names of the person who erected the altar, and I suppose MEN to be a third name of the same person. The line in the base I have ventured to read *Ex jussu susceptum solvit libenti animo;* because it was common for them to pretend that they took a vow upon them by the command or order of some deity. Parallel instances of this kind may be seen in this collection. " Mr. Ward reads the letters EX CC IMP : *ex charissimae conjugis impensa;* and so refers *ex jussu susceptum* on the base, to the order of the widow, who, not being present, desired this *Quintianus,* a friend or relation of her deceased husband, to erect this monument at her expense. In *Manutius* CC stand for *Charissima conjux ;* but if any think them put for *contubernalium* here, the sense will not be incongruous."

It is evident that this is a most unsatisfactory explanation. *Ex jussu* certainly refer to ' the order ' of the deities, to whom the altar was erected ; and there can be but little doubt that those deities were not the *Di Manes,* for such an order is unprecedented and improbable. To the expansion—*ex charissimæ conjugis impensa*—the same objections may be made. EXCC evidently stand for* *ex ducenario,* and IMP most probably for *Imperatoris.* It does not appear that any explanation of MEN has been attempted: I regard it as standing for *Mensor**. If there be a point after IV as well as after S, then Horsley's expansion—*ex jussu susceptum*—is correct, but I am inclined to think that there was none after IV, so that IVS stands for *jussu.* But what of *Condati?* I think that the reference to *Condate* of the Itinerary is highly probable, and would expand the word in the inscription into *Condatianis* or *Condatinis, i. e. Quintianus mensor ex ducenario Imperatoris ex jussu solvit libens animo.* Horsley's objection that *Condate* was far from the spot, where this stone was found, seems to me of trifling value. We have many examples of dedications to *Matres* or to other deities, in localities far distant from the place indicated by their designations. The dedication in the inscription is sufficiently explained by the supposition that Attonius Quintianus had resided at or visited *Condate.*

---

* See Orelli, nn. 3182, 3342, 5064. These *ducenarii* are often mentioned in the list of Provincial officials. See the *Notitia,* ed. Böcking, pp. 54, 56, 58, 60, 277, *70, *72, *75, &c., and compare Facciolati on the word.

The other inscription, to which I have referred, is Horsley's *Northumberland,* n. xxxiii:—

D M D
TRANQVIL
A·SEVERA
PRO·SEET·SVI
S·V·S·L·M

He expands it thus: *Dis Manibus dicatum Tranquila Severa pro se et suis votum solvit libens merito.*

I have never met with an example of the dedication of an altar by any one *pro se et suis* to the *Di Manes,* and yet, if there had been such an usage, there would, most probably, be many such, for doubtless the object would be to induce them to spare in illness or to receive kindly after death. I have but little doubt that D·M·D stand for *Deabus Matribus Domesticis;* although it is possible that the reading may be incorrect, and that the letters are really D·M·ID, i.e., *Deæ Magnæ Idææ.*

66. The following inscription on a stone, found at Old Penrith, Cumberland, is given by Camden, iii. p. 426, ed. Gough:—

---

* *Mensores* are also noticed among Provincial officials. See the *Notitia,* ed. Böcking, 28, 38, 214, 236. *293, 300.

. . . . .

GADVNO
VLP TRAI
EM·AL·PET
MARTIVS
FP·C

Horsley's expansion and remarks on it are as follows :—

> "*Gaduno Ulpius Trajanus, emeritus alæ Petrianæ, Martius faciendum procuravit.* Burton (I suppose from the authority of this inscription) reckons *Gadunus* among the northern tutelar deities; but by the conclusion of the inscription *faciendum procuravit,* I rather take *Gadunus* to have been the name of a person deceased, for whom *Ulpius Trajanus Martius* an *emeritus* of the *ala Petriana* took care to have this funeral monument erected. Mr. Ward thinks 'tis more likely the *emeritus* was the deceased person, and therefore reads this inscription: *Gaduno Ulpio Trajano emerito alæ Petrianæ Martius frater ponendum curavit.*

Horsley's view that *Gadunus* was the name of the person deceased is very probable, but there is no authority for *Ulpius Trajanus Martius*, especially broken as it is by the intrusion of EM·AL·PET. It seems to me that VLP TRAI are parts of CH·I·VLPIAE TRAIANAE AVG·C·R·, which, we know from Hadrian's diploma, was in Britain in A.D. 124; and I accordingly regard *Gadunus* as a member of that corps at his decease, having previously served his full time as *eques Alæ Petrianæ.* He had probably received his *missio honesta* from that *ala,* having served twenty-five *stipendia,* and obtained with it the usual privileges *civitatis et connubii.* F P C appears to me to stand, (as Mr. Ward suggested), for *frater ponendum curavit, Martius* being the name of the brother.

67. In the *Illustrated Catalogue* of the Museum of the Society of Antiquaries of Newcastle-upon-Tyne, n. 70, "a part of a slab, from *Vindolana,* the modern Chesterholm," is figured. Dr. Bruce gives the following remarks on it.

> "Its right bears a Roman *Vexillum,* or standard; the left is gone. The inscription is very imperfect. The first line has the letters COH, the second, PROBI."

In the woodcut the inscription is given thus, as I read it :—

COH
PROBI
OS
AVG.

Before OS is the fragment of a letter, which may have been C. If this be the fact, COS will stand for *Consulibus*, whence we may assume that the names of the consuls were wholly or partly in the preceding line. From this it may be inferred that the date of the inscription is A.D. 322, in which *Probianus* and *Julianus* were consuls. The letters AVG might suggest that the name of the Emperor was also given, but they more probably denote the month of August, and were preceded by some letters specifying the day, in which something was completed or dedicated by the Cohort named in the first line on the missing part of the slab.*

68. It has been inferred, from inscriptions on some altars found in the north of England, that a god, called *Vetires*, or *Vitires*, was worshipped in that locality. See Horsley, *Brit. Rom.*, *Nor.* lxvii., *Durh.* vi., xix. Dr. Bruce, *Roman Wall*, p. 399, 2nd ed., offers the following remarks on an altar, having the letters—VITIRBVS.:

> "Vitres, or Viteres, or Veteres, is a god whose name is confined to the north of Britain. Hodgson remarks that Vithris was a name of Odin, as we find in the death-song of Lodbroc:—'I will approach the halls of Vithris with the faltering voice of fear.' If Veteres and the Scandinavian Odin be identical, we are thus furnished with evidence of the early settlement of the Teutonic tribes in England. The occurrence of the name of this god in a plural form, has suggested the idea that Viteres is not the proper name of a god, but that *diis veteribus*—the ancient gods—is the inscription intended. Most probably, however, Viteres was the name of a local deity."

The following are the principal forms in which the name appears on those altars:—DEO VITRI SANCTO, DEO SANC VETERI, DEO VETRI SANCT, DEO VITIRI, DEO VITIRINE, DEO VITERINE, DEO MOGONTI VITIRES. But, the word is also found in the plural, as †DIBVS VETERIBVS, DEABVS VITBVS,

---

* In proposing this explanation I have assumed that the stone is not of the class, called *Centurial*, but I am not satisfied that it is not.

† Horsley, Northumberland, lxix., gives an inscription, which he reads *Dirus Vitiribus Deccius votum solvit libens merito*, regarding the first three words as the name of the dedicator. Mr. Wright, *Celt, Roman, and Saxon*, p. 296, 2nd ed., renders this inscription thus:

DIRVS	To the rustic gods
VITIRBVS	Vitires,
DECCIVS	Deccius
V·S·L·M	performs a vow willingly and dutifully.

This reading, DIS RVSTICIS, may be regarded as an improvement on Horsley's, but I have no doubt that both are incorrect. Dr. Bruce judiciously infers, from another altar, "which has the letter B of DIBVS quite plain," that "Horsley should have read DIBVS, not DIRVS." *Dibus* is sometimes used in epigraphy for *Diis*.

VITIRBVS. The explanation of these forms, which at once presents itself, is that the varieties are due to the misspelling or misreading of *Veteri* and *Veteribus.* †**Vitirine* and †**Viterine* seem to me, also, to be forms of *Veteraneo,* from *Veteraneus,* an adjective of the same meaning with *Vetus.* Thus we have on altars found in Germany, MATRONIS VETERANEHIS, which may be explained as *Veteraneis,* i. e. *Veteribus,* without reference to *Castra Vetera,* as Lersch suggests. The form *Deo Mogonti Vitires* is peculiar. I am inclined to regard it as standing *for Deo Mogonti * Veteri sancto,* and infer from it a confirmation that the word, which has been taken for the name of a god, is really the ordinary adjective, signifying "ancient." These altars have characteristics that are worthy of notice. The †majority of them were erected by persons having but one name, not improbably Britons; on some of them the name of the dedicator is omitted; there is, I believe, but ‡one instance in which a military corps is specified; and there is not one, so far as I know, in which the date is given, nor am I aware of any example of *Deæ Veteri.* They all, however, seem to indicate a preference of the old objects of worship to the new, it may have been, of the native to the imported gods, or of paganism to Christianity. To the argument, derived from the fact that such inscriptions are limited to the north of England, I am not disposed to attach much weight. Altars both to known and unknown deities might be expected in that part of the island, where there was so large a concentration of troops to guard the wall and its outposts; and here, too, it is reasonable to suppose that there would be traces of the conflicts between old and new religions.

---

† The first of these forms appears on an altar, noticed by Camden; the second on one figured in *The Illustrated Catalogue,* &c., n. 96. Dr. Bruce's remarks on it are:

> "The letters are tolerably distinct, but the reading is doubtful. it may be—*Deo Veteri Nepos Calames (?) votum solvit libens:* 'Willingly dedicated to the ancient god, in discharge of a vow.' In every age there have been setters forth and denouncers of "Strange Gods"—advocates and opponents of the "new" and the "old learning." Hodgson reads it—"To the veterinary god."

It must also be borne in mind, in judging of this, that there seems to have been a local god, named Vitris or Veteres"

There can, I think, be no doubt that the expansion *Nepos* is incorrect, and that we should read *Deo Veterineo.* With regard to the remainder of the inscription, I venture to suggest that the letters read CALAM may be CH·I·HAM, *i.e. Cohors prima Hamiorum,* and that E·S may stand for *ex suscepto, scil. voto.*

* Mr. Ward's explanation *Vitæ restitutori,* which was approved by Horsley, is certainly erroneous.

† This affords a strong, but not decisive argument in favour of the deity being native.

‡ This favours the belief that the deity was not one specially worshipped by the auxiliary troops.

Of all such altars, the most interesting is one found at Chester-le-Street, and now preserved in the Museum of the Society of Antiquaries of Newcastle-upon-Tyne. It is figured in the *Illustrated Catalogue*, n. 151, and Dr. Bruce offers the following remarks upon it:

> "The inscription is indistinct. It has probably been addressed—
>
> DEABVS
> VET[ERI]BVS
> V·S·L·M."

The letters, as they appear in the woodcut, are,—

DEABS
VITBVS
VIAS
VADRI.

There can, I think, be no reasonable doubt of the correctness of the expansion of the first two lines, as given by Dr. Bruce: but I can see no ground for the reading V·S·L·M. I am inclined to regard VIAS as standing for for VIA·S[TRATA] or VIA[E]·S[TRATÆ], and VADRI for VADR[A]E. VADRAE seems to be another form of VEDRAE, the name of the river believed by Horsley to be the Tyne, and by others to be the Wear. But what is the construction? If it be taken as *Via Strata Vedræ*, and this be regarded as the designation in the Roman period of "Chester-le-Street," this altar may have been erected "to the ancient goddesses," by the town. But this is not probable. I prefer **Viæ Stratæ*, as referring to the paved road—most probably that leading to *Pons Ælii*. Then *Viæ Stratæ* and *Vedræ* may be either in the genitive or the dative. If we take them as the latter, then "the ancient goddesses" were the Road [and] the River; if as the former, then the deities are the ancient goddesses of the Road [and] of the River. Another construction may be suggested, whereby *Viæ Stratæ* may be in the genitive, and *Vedræ* in the dative. The locality of the stone seems to support the views of those who regard *Vedra* as the name of the Wear, not of the Tyne. The term *Veteribus* may manifest a preference of the old deities to the imported, or to "The God" of Christians, or, perhaps, may indicate a jealous feeling as to some new road or roads, of which there seem to have been several at or near this station, or the belief in the superiority of the paved (*strata*) road to some other, a mere dug-way. In ancient Britain, doubtless, this superiority was as fully felt as it is now in this country. The inscription—*Deo qui vias et semitas commentus est*—intimates an appreciation, such as we are familiar with here, of the advantages of roads.

---

* When *via* is used in composition as the name of a town, it is placed last, *e. gr. Vinovia*, *Bovium*. I am not aware of any example of the combination of *via* and *strata* in this sense, except, probably, *Stravinia*, a town in Pannonia, mentioned in the Itinerary of Antoninus.

69. In n. 32 of the *Illustrated Catalogue* of the Museum of the Society of Antiquaries of Newcastle-upon-Tyne, "the fragments of a large inscription, evidently dedicated to Caracalla," are figured:

I SEPT
I SARMATI
ANTON
RIE PROCONSVLI PRO
M SENATVS HAC
GIONVM ITEM

Dr. Bruce gives the following reading, translation, and remarks:

"*Imperatori Caesari*
DIVI SEPTIMII *Severi filio*
Marci ANTONINI PII SARMATICI *nepoti*
Marco Aurelio ANTONINO
PROCONSULI

To the Emperor Caesar Marcus Aurelius Antoninus, proconsul, the son of the deified Septimus Severus, the grandson of Marcus Antoninus Pius, [styled] Sarmaticus.........

The latter part of the inscription is too incomplete to admit of even a conjectural interpretation; the words *decretum Senatus*, and *legionum*, are, however, distinct."

The fourth line seems to me to be part of the formula *Patri Patriæ* (*scil. Patrie* for *Patriæ*), *Proconsuli* (as Dr. B. reads it), **Propagatori* Imperii; and after this, perhaps immediately, came the name and titles of Julia Domna, possibly thus:—ET IVLIAE

---

* Caracalla inherited this title from his father. See Henzen, nn. 5340, 5493.

*AVGVSTAE MATRI *AVGVSTI·CASTRORVM. The M of *castrorum* is, I think, the first letter of the fifth line. Then we have SENATVS·†AC (spelled ‡HAC) and after this came PATRIAE.§ The words *decretum senatus* were unquestionably not in the inscription, but it is almost certain that *legionum* was. After ITEM, perhaps, came COHORTES or COHORTIVM, for the dedication probably comprehended both legions and auxiliary cohorts, and, it may be, *alæ* also. The inscription was on a scale of unusual magnitude, and was, I suspect, the joint dedication of the legionary and auxiliary troops stationed along the line of the Wall or its outposts. It affords strong additional evidence of the importance of the station at Risingham.

69. The fragment of another slab from Risingham, bearing a portion of a dedication to the same Emperor and his mother, also on a large scale, is figured in No. 37.

MIFILIODI
IIRRTICHIET
TRIBPOTESTA
ATRIAVGVST
POSVERVNT

The following are Dr. Bruce's remarks on it:—

> "*Imperatori Cæsari Divi Septimii Severi Britannici* MAXIMI FILIO DIVI *Antonini Pii* PARTHICI (?) ET.,.......*nepoti Pontifici* MAXIMO TRIBVNITIA POTESTATE.........*Et* MATRI AVGVSTI.........POSUERUNT (The army) erected (this building and dedicated it) to the Emperor Cæsar the son of the deified Septimius Severus (surnamed) Britannicus Maximus and grandson of Antoninus Pius (surnamed) Parthicus and to the mother of the Emperor (Julia Domna).

The fragment is fractured, so that some of the letters at the beginning of the second line seem to be doubtful. There can, however, be but little doubt that Dr. B's. reading—PARTHICI—should be adopted. But his expansion is certainly not correct, as is plain from the absence of NEP. or N. for *Nepoti*, after *Parthici* and before *et*, where, according to his view, it should appear. The succession of the titles of Caracalla, given here, seems to me to have been similar to that in Horsley's Northumberland, cxiii., so that the ET was preceded by DIVI TRAIANI PARTHICI and followed by DIVI NERVAE ADNEPOTI. See Orelli, nn. 926, 927. In n. 33, where a portion of another dedication to Caracalla is figured, we have in the second line a part of DIVI ANTONINI PII PRONEPOTI.

---

* I have given these in full, as there are no abbreviations in the fragments, but they were, probably, AVG·, and between IVLIAE and AVG· may have been P·F· *i. e., piæ felici.*

† Thus, in Henzen, n. 6914, AC PATRIAE.

‡ Thus, in Orelli, n. 23, FORTISSIMO HAC BEATISSIMO, and in De Rossi, *Inscript. Christ.*, n. 376, CASTAE HAC SANCT.

§ It is strange that Dr. Bruce should have overlooked this reading, for he correctly gives a portion of the same formula in n. 120.

70. In the *Roman Wall*, p. 385, 2nd ed., and in the *Illustrated Catalogue*, p. 84, an altar, found at Risingham, is figured. It bears the following inscription:—

FORTVNAE
SACRVM.Cos
VALERIVS
LONGINVS
TRIB

The inscription, a little abbreviated, is repeated, on a lower projecting base. Dr. Bruce, *Roman Wall*, reads it thus: *Fortunæ Sacrum Valerius Longinus Tribunus;* and in the *Illustrated Catalogue*, prefixes C *i.e.* "*Caius.*" In the wood-cut the letters OS are distinctly legible after, or, rather, within C. If they are genuine, of which I have some doubt, arising chiefly* from Dr. Bruce's omission of any notice of them, we have, I think, an example of the rare *prænomen*, *Cossus*. See Gruter, cvii. 1, 2; Fabretti, p. 26; Marini, *Atti*, i. pp. 86, 103; Orelli, n. 2713.

71. In the *Roman Wall*, p. 401, 2d ed., an altar is figured, bearing the inscription, as Dr. Bruce reads it—"LAMIIS TRIBVS,—To the three Lamiæ." Altars to these female vampires, the terror of Roman† children, are very rare. I have never met with another example, unless my view be correct with regard to the inscription, given in Gruter, cvii. 4. It is there read thus:—

LVMIIS
EX VOTO
PRIMICENIVS
LITIO.

---

* In the *Archæologia Æliana*, iii. p. 162. this altar is also figured. In that representation, a leaf point takes the place of the OS.

† Hor. A. P., 340. *Nec pransæ* Lamiæ *vivum puerum extrahat alvo.*

Gudius suggested the emendation LYMPHIS. To me this seems much less probable than that the word was LAMIIS, the A being turned upside down, of which there are examples, for instance, Horsley's *Northumberland*, n. xviii.

72. In the *Illustrated Catalogue*, &c., n. 92, we find the following "portion of an inscription" on the part of a slab found at *Æsica*, Great Chesters:

......VS ANTONINO ET
THICIS MEDICIS
M * IRAETORV
TAT.. CIT ET

"A hole has been bored through the stone at the place marked by the asterisk."

As there is no wood-cut representing the stone, nor any remarks on it, it is not easy to suggest a satisfactory rendering or interpretation. There are, however, some portions about which there can be no doubt. It is plain, from the epithets *Parthicis Medicis*, that the Emperors named were *Marcus Aurelius Antoninus* and *Verus*, and that the date is consequently A.D.* 165–169. It may also be assumed that VS in the first line are the final letters of DVOBVS, as we have on a pig of lead, found in Somersetshire,

IMP·DVOR·AVG ANTONINI
ET VERI ARMENIACORVM.

Here all that is certain is exhausted. If we accept the reading, as given by Dr. B., of the next two lines as correct, and regard some letters as lost by the boring between M and I, it is probable that M was the last letter of the designation of the building or work executed, or of the participle or adjective agreeing with it, and that the rest of the line was CH·I·RAETORVM (*Cohors prima Ræstorum*), followed by EQVITAT· (*equitata*), or MIL·EQVITAT (*Miliaria equitata*) of which the last three letters (TAT) are in the fourth line; and after this we seem to have FECIT.ET. This reading is liable to the objection that there is no evidence that a Cohort of Rætians was ever in Britain. This objection, however, is not of much importance, as there are other examples of Cohorts named on stones found in Britain, for whose presence in the island we have no other authority. When I first saw the inscription, I read PRAETORIVM [COLLAPSVM VETVS]TAT·[REFE]CIT, regarding M as the last letter of the designation of the corps that executed the work, and supplying between it and I, C·R· or EQ· or M·EQ. I was not, however, satisfied with this. It then occurred to me that E perhaps was a misreading of S, and thus, retaining the reading P for I, we get CH·PR·ASTORUM i.e. *Cohors prima Astorum* (otherwise *Asturum*), the Cohort stated in the *Notitia* to have been stationed at Æsica.

---

* See Orelli, n. 859.; Henzen's *Index*, p. 69; Clinton's *Fasti Romani*, vol. i. pp. 154, 162.

73. In* *Aquæ Solis*, or "Notices of Roman Bath," by the the Rev. H. M. Scarth, M.A., p. 77, we have the following account accompanying a drawing of an inscribed marble fragment found in that city in 1861 :—

"The inscription is on white marble, apparently foreign, since none is found in England, though it is in Ireland.

The letters are as follows :—

DEAE · S
TI · CL · T
SOLLEN

(also portions of letters, which may be E or F, and LI, or II or H, of smaller size.)

The letters are particularly well cut, and seem to belong to an early period of the Roman occupation of our Ireland. The small fragment of the letter S leaves little doubt that the dedication was to the DEA SVL or SVLMINERVA to whom, as we have seen, six inscriptions relate· and also a temple or other building was dedicated. In the second line we have the abbreviations of two names of the dedicator TI(BERIVS) CL(AVDIVS), with a triangular stop after each, clearly cut, and the first letter of the cognomen (T), which may be any Roman name beginning with that letter. The third line commences with the word SOLLEN; but the remainder is broken away, leaving us to conjecture that it was the word SOLLENNES or SOLEMNES, and referred to the vows paid to the tutelary goddess. The word SOLLEMNIS occurs in an inscription on marble preserved in *Fabretti*, and also given in *Orelli*, and is a fragment of a funeral laudatory Inscription of the Augustan age. The letters commencing the fourth line are cut smaller, but it is not possible to conjecture the word of which they formed components."

I have but little doubt that the letters SOLLEN formed a part of the name SOLLENNIS or SOLLEMNIS, the cognomen of the dedicator. These forms of the name are not noticed in the Index to

---

* A handsome volume, with numerous illustrations, lately published by R. E. Peach, Bath. It contains full and accurate information regarding the many interesting memorials of Bath, during the Roman period, that have been found in or near that city.

Gruter, but they are sometimes found *e. gr. T. Sennio Sollemni* on the monument at *Vieux.* See Smith's *Collect. Antiq.* iii. p. 92. In the first line *Suli* or *Suli Minervæ* followed *Deæ.* In the second after TI·CL·T were, most probably, I·F followed, perhaps, (according to the normal order), by the name of the tribe *e. gr.*, GAL : *i. e. Tiberius Claudius Tiberii filius* [Galeria]. *Sollennis* in the third line may have been followed by the name of his *birth place, and perhaps by the preposition *ob* or *pro* ; and it is not improbable that the three broken letters of the fourth line were FIL, *i.e. filium* or *filiam, filio* or *filia.* We may conjecture, then, that this altar was erected on account of, or for the recovery of the son or daughter of the dedicator, *scil. ob filium* (*or filiam*), [morbo recreatum or recreatam], or *pro filio* (or *filia*) [morbo male adfecto or adfecta].

Many altars of this class must have been erected in Bath to the deity presiding over the waters, either as a thank-offering for health restored or as a propitiation during sickness for recovery. In this case it seems probable that Sollennis vowed to Sul-Minerva, that if his child should obtain relief from the use of the waters, he would erect to her a marble altar ; and that this fragment is a portion of that which he erected in fulfillment of the vow. See Horace, *Odes,* iv., 1, 20, where, however, the vow relates to a statue.

74. In the same volume, p. 79, we find the following fragment of an inscription :—

AIIVS
ONDEDIT
ET QVINTIANO COS

Mr. Scarth's remarks on it are :—

"The inscription, which was on white lias stone, was found in digging out the remains of a building, which was one of several that bordered on the line of the Foss Road, six miles from Bath, and about a mile beyond the Red Post Inn. It is not known what has become of it. With it were found part of a stone statue and pieces of painted stucco. The first line is much defaced, only the letters A, V and S, being distinctly legible. The letters between the A and V may have been a T and I, or P and I, or II, so that the name seems to have terminated in the form ATIVS, or APIVS, or AIIVS. The next word is plainly [C]ONDEDIT, an E being put for an I. In the third line we have ET QVINTIANO COS. So that we are able to supply what is wanting, knowing that Bassus was consul with Quintianus, A.D. 289, i.e., in the first or second year of Carausius. The inscription will therefore stand thus :—

---

* Almost certainly on the continent, where doubtless the marble was got.

Name of person who erected the building ending

ATIVS or APIVS or AIIVS
CONDIDIT
BASSO ET QUINTIANO COS

In the fac-simile which Mr. Skinner has preserved in his MS., the stone is small, about 8 inch by 2½ inch, and the building itself appears not to have been mentioned in the Inscription, only the name of the builder and the date. It was found in digging out the interior of a small inner chamber.

The reading—CONDIDIT—seems to me very improbable. For what was it that was "founded" or (as some translate) "built?" Certainly not *urbs* nor *oppidum*, nor the equivalent *mœnia*. Neither can it have been *murus*, *templum*, *ædes*, *basilica*, *horreum*, or some such object, for it will, I think, be difficult to find any authority in ancient authors or inscriptions for this use of the verb. A stone, indeed, is said to have been found, near Carlisle, on which was inscribed—SEPT. SEVERO·IMP-QVI MVRVM HVNC CONDIDIT, but this is evidently a *counterfeit, bearing no resemblance to a genuine inscription. Dr. Bruce, of course, rejects it as "obviously spurious." I suggest [D] ON·DEDIT, *i.e. dono dedit* as a much more probable reading.

MEAN METEOROLOGICAL RESULTS AT TORONTO FOR THE YEAR 1864.

BY G. T. KINGSTON, M.A.
DIRECTOR OF THE PROVINCIAL MAGNETIC OBSERVATORY, TORONTO.

The mean temperature of the year 1864 was 44°.70, or 0°.53 in excess of the average of twenty-five years. The deviation of the monthly means above or below their respective averages, and irrespective of sign, had an average amplitude of 1°.36 ; thus indicating a year of unusually equable temperature, the average amplitude in twenty-five years being 2°.33.

---

* See Camden, iii., p. 513.

The mean deviations of temperature in the four seasons, with their proper signs, were: −0°.33 in Winter; +0°.79 in Spring; +2°.27 in Summer; and −0°.60 in Autumn.

As regards rain and snow, there was, on the whole year, an excess amounting to 0.655 inches of water. An excess occurred in Winter, Spring, and Autumn—the total precipitation exceeding the average by 1.136 inches in Winter, 1·788 inches in Spring, and 0.186 inches in Autumn. In Summer, the rain was deficient as compared with the average by 2.405 inches. This deficiency was not much greater than that of the summer of 1863; but the distribution among the three summer months was very different in the two years, for while in the summer of 1863 there was a moderate deficiency in each month, the rain in June, 1864, was less than one-fifth, and in July little over one-third of the average fall; that of August being above the average in the ratio of 5 to 3 nearly.

In the following summary several of the results for the year 1864 are compared with the averages derived from a series of years as well as with extreme values of analagous results given by the same series.

TEMPERATURE.

	1864.	Average of 25 years.	Extremes.	
Mean temperature of the year	44°.70	44°.17	46°.36 in '46.	42°.16 in '56.
Warmest month	July.	July.	July, 1854.	Aug. 1860.
Mean temperature of the warmest month	69.73	66.98	72.47	64.46
Coldest month	January.	February.	Jan. 1857.	Feb. 1848.
Mean temperature of the coldest month	22.79	22.99	12.75	26.60
Difference between the temperatures of the the warmest and the coldest months	46.94	43.99	——	——
Mean of deviations of monthly means from their respective averages of 25 years, signs of deviation being disregarded	1.36	2.33	3.58 in 1857.	1.36 in '64.
Months of greatest deviation, without regard to sign	May.	January.	Jan. 1827.	——
Corresponding magnitude of deviation	3.1	3.7	10.8	——
Warmest day	June 25.	——	July 12, '45.	July 31, '44.
Mean temperature of the warmest day	81.77	77.45	82.32	72.75
Coldest day	Feb. 17.	——	Feb. 6, '55 Jan. 22, '57	Dec. 22, '42.
Mean temperature of the coldest day	−4.62	−1.02	−14.38	+9.57
Date of the highest temperature	Aug. 8.	——	Aug. 24, '54.	Aug. 19, '40.
Highest temperature	94 0	90.6	99.2	82.4
Date of lowest temperature	Feb. 17.	——	Jan. 26, '59.	Jan. 2, 42.
Lowest temperature	−15.0	−12.4	−26.5	+1.9
Range of the year	109.0	103.0	118.2	87.0

BAROMETER.

	1864.	Average of 18 years.	Extremes.	
Mean pressure of the year	29.5596	29.6133	29.6679 in 1849.	29.5596 in 1864.
Month of highest mean pressure	June.	Septemb'r	June, 1849.	June, 1864.
Highest mean monthly pressure	29.6545	29.6629	29.8030	29.6545
Month of lowest mean pressure	May.	June.	March, 1859.	Nov. 1849.
Lowest mean monthly pressure	29.4721	29.5624	29.4215	29.5868
		Average of 9 years.		
Date of highest pressure in the year	Dec. 9, 10 a.m.	—	Jan. 1855,	Dec. 1854.
Highest pressure	30.327	30.372	30.552	30.245
Date of lowest pressure in the year	Nov. 4, 2 p.m.	—	March, 1859.	March, 1858.
Lowest pressure	28.671	28.592	28.286	28.849
Range of the year	1.656	1.780	2.106 in 1859.	1.429 in 1860.

RELATIVE HUMIDITY.

	1864.	Average of 20 years.	Extremes.	
Mean humidity of the year	76	78	82 in 1851.	73 in 1858.
Month of greatest humidity	Dec., Jan. and Feb.	Jan.	Jan. 1857.	Dec. 1858.
Greatest mean monthly humidity	82	83	89	81
Month of least humidity	June.	May.	Feb. 1843.	April, 1849.
Least mean monthly humidity	63	72	58	76

EXTENT OF SKY CLOUDED.

	1864.	Average of 12 years.	Extremes.	
Mean cloudiness of the year	0.65	0.60	0.65	0.57
Most cloudy month	December	December	—	—
Greatest monthly mean of cloudiness	0.80	0.75	0.83	0.73
Least cloudy month	June.	August.	—	—
Lowest monthly mean of cloudiness	0.30	*0.47	0.30	*0.45

* The average lowest monthly mean of cloudiness in column (2) is the least of the twelve monthly means derived each from twelve years, and does not include the lowest months in each year, as these fall differently in different years. This explains why the *highest* minimum in column (4) should be less than the average minimum. The average value of the greatest as well as of the least monthly means of the several elements, and given in column (2), are similarly obtained, and therefore do not necessarily lie between the numbers in columns (3) and (4).

In the case of the warmest days, or the highest temperatures in each year, and other analogous quantities, the averages in column (2) are derived from the corresponding values in each year, independently of the time of their occurrence, and must of necessity lie between the numbers in columns (3) and (4.)

WIND.

	1864.	Result of 17 years.	Extremes.	
Resultant direction	N 76° W	N 59° W	—	—
Mean resultant velocity in miles	2.49	1.83	—	—
Mean velocity, without regard to direction	7.40	6.88	—	—
Month of greatest mean velocity	January.	March.	March, 1860.	Jan. 1848.
Greatest monthly mean velocity	10.22	8.67	12.41	5.82
Month of least mean velocity	June.	July.	Aug. 1852.	Sept. 1860.
Least monthly mean velocity	4.53	4.97	3.30	5.79
Day of greatest mean velocity	Jan. 1.		—	—
Greatest daily mean velocity	28.37		—	—
Day of least mean velocity	June 17.		—	—
Least daily mean velocity	Calm.		—	—
Hour of greatest absolute velocity	Nov. 10, 1 to 2 a.m.		— —	— —
Greatest velocity	40.2		—	—

RAIN.

	1864.	Average of 23 years.	Extremes.	
Total depth in the year in inches	29.486	29.955	43.555 in 1843.	21.505 in 1856.
Number of days in which rain fell	132	108	130 in 1861.	80 in 1841.
Month in which the greatest depth of rain fell	August.	November	Sept. 1843.	Sept. 1848.
Greatest depth of rain in one month	5.060	3.765	9.760	3.115.
Month in which days of rain were most frequent	October.	October.	Oct, 1864.	May, 1841.
Greatest number of rainy days in one month	22	13	22	11
Day in which the greatest amount of rain fell	Aug. 26.	—	Sept. 14, 1843	Sept. 14, 1848
Greatest amount of rain in one day	1.324	2.067	3.455	1.000
Hour of heaviest rain	Aug. 26, 4 to 5 p.m.	—	—	—
Greatest amount of rain in one hour	0.770	—	—	—

SNOW.

	1864.	Average.	Extremes.	
Total depth in the year in inches	74.6	63.4	99.0 in 1855.	38.4 in 1851.
Number of days in which snow fell	70	59	87 in 1859.	33 in 1848.
Month in which the greatest depth of snow fell	December	February.	Feb. 1846.	Dec. 1851.
Greatest depth of snow in one month	27.1	18.1	46.1	10.7
Month in which days of snow were most frequent	December	December	Dec. 1859. Jan. 1861.	Feb. 1848.
Greatest number of days of snow in one month	18	13	23	8
Day in which the greatest amount of snow fell	Jan. 19. Dec. 21.	—	Feb. 5, 1863	Feb. 26, 1854 Jan. 10, 1857
Greatest fall of snow in one day	10	8.5	16	5.5

The accompanying table is a general abstract of the Meteorological Observations made at the Magnetic Observatory, Toronto, during the year 1864.

GENERAL METEOROLOGICAL

Provincial Magnetical Observ

LATITUDE, 43° 39′ 4″ North; LONGITUDE, 5h. 17m. 33s. West.—Elevation above

	JAN.	FEB.	MAR.	APR.	MAY	JUNE.	JUL.
Mean temperature	22°.79	24°.32	29°.12	40°.95	54°.81	63°.03	69°.73
Difference from average (25 years)	− 0.82	+ 1.33	− 0.74	− 0.01	+ 3.13	+ 1.69	+ 2.75
Thermic anomaly (Lat. 43° 40′)	−10.01	−10.38	−10.98	− 9.25	− 3.29	− 1.57	+ 1.03
Highest temperature	44.2	45.0	50.2	59.4	79.0	93.4	90.2
Lowest temperature	− 9.0	−15.0	3.0	28.1	32.2	34.8	49.0
Monthly and annual ranges	53.2	60.0	47.2	31.3	46.8	58.6	41.2
Mean maximum temperature	29.58	31.52	35.59	47.48	62.86	73.06	79.95
Mean minimum temperature	17.51	18.94	22.44	34.61	46.20	52.87	59.79
Mean daily range	12.07	12.58	13.16	12.87	16.67	20.19	20.16
Greatest daily range	26.9	37.4	28.4	24.4	26.2	31.7	31.2
Mean height of barometer	29.5887	29.4914	29.5082	29.5968	29.4721	29.6545	29.6289
Difference from average (18 years)	−.0447	−.1208	−.0741	+.0098	−.1125	+.0921	+.0275
Highest barometer	30.102	30.124	30.067	29.964	29.788	29.961	29.831
Lowest barometer	28.910	29.009	28.829	29.301	29.166	29.007	20.319
Monthly and annual ranges	1.192	1.115	1.238	0.663	0.622	0.954	0.512
Mean humidity of the air	.82	.82	.80	.75	.75	.63	.66
Mean elasticity of aqueous vapour	.110	.119	.135	.194	.333	.380	.473
Mean of cloudiness	.67	.72	.66	.74	.68	.30	.44
Difference from average (12 years)	−.05	+.01	+.06	+.15	+.15	−.22	−.04
Resultant direction of the wind	S 73 W	S 84 W	N 53 W	N 41 E	N 7 W	N 55 W	N 61 W
" velocity of the wind	6.00	6.48	2.29	3.39	1.86	1.72	2.23
Mean velocity (miles per hour)	10.22	10.11	8.41	7.77	5.64	4.53	6.00
Difference from average (17 years)	+2.22	+ 1.77	−0.26	−0.29	−0.95	−0.74	+1.03
Total amount of rain	1.165	0.397	1.620	3.633	4.070	0.570	1.332
Difference from average (24 & 25 yrs)	−0.166	−0.603	+0.063	+1.200	+0.864	−2.297	−2.142
Number of days rain	5	2	9	16	18	5	8
Total amount of snow	26.3	9.5	3.7	3.5	0.0	...	...
Difference from average (22 years)	+11.15	− 8.55	− 5.40	+ 1.10	− 0.09	...	...
Number of days snow	14	14	12	3	0	...	...
Number of fair days	14	13	14	14	13	25	23
Number of auroras observed	0	4	2	4	3	5	3
Possible to see aurora (No. of nights).	11	11	15	10	12	24	19
Number of thunderstorms	0	0	0	0	5	2	4

REGISTER FOR THE YEAR 1864.

atory, Toronto, Canada West.

Lake Ontario, 108 Feet; approximate Elevation above the Sea, 342 Feet.

Aug.	Sept.	Oct.	Nov.	Dec.	Year 1864.	Year 1863.	Year 1862.	Year 1861.	Year 1860.	Year 1859.	Year 1858.
°	°	°	°	°	°	°	°	°	°	°	°
68.58	56.36	45.17	36.91	24.66	44.70	44.57	44.35	44.22	44.32	44.19	44.74
+ 2.37	— 1.48	— 0.48	+ 0.16	— 1.50	+ 0.53	+ 0.40	+ 0.18	+ 0.05	+ 0.15	+ 0.02	+ 0.57
+ 0.08	— 5.14	— 8.63	— 6.29	—11.34	— 6.30	— 6.43	— 6.65	— 6.78	— 6.68	— 6.81	— 6.26
94.0	73.0	67.0	60.2	50.4	94.0	88.0	95.5	87.8	88.0	88.0	90.2
47.0	37.8	28.0	21.0	—10.4	—15.0	—19.8	— 5.2	—20.8	— 8.5	—26.5	— 7.3
47.0	35.2	39.0	39.2	60.8	109.0	107.8	100.7	108.6	96.5	114.5	97.5
77.24	63.94	52.05	42.85	32.23	...	...	...	...	...	...	...
61.41	48.96	39.73	31.31	19.71	...	...	...	...	...	...	...
15.83	14.98	12.32	11.53	12.52	14.57	14.73	14.43	14.42	14.24	13.66	13.84
29.2	27.0	26.0	24.2	31.4	37.4	39.6	37.0	33.3	30.7	39.8	31.2
29.5450	29.6097	29.5207	29.5790	29.5198	29.5596	29.6536	29.6248	29.6008	29.5923	29.6209	29.6267
—.0763	—.0532	—.1293	—.0349	—.1282	—.0537	+.0403	+.0115	—.0125	—.0210	+.0076	+.0134
29.863	29.975	29.890	30.126	30.327	30.327	30.502	30.469	30.330	30.267	30.392	30.408
29.099	29.230	29.026	28.671	28.854	28.671	28.704	28.805	28.644	28.838	28.286	28.849
0.764	0.745	0.864	1.455	1.473	1.656	1.798	1.664	1.686	1.429	2.106	1.559
.73	.75	.80	.78	.82	0.76	0.77	0.77	0.78	0.77	0.74	0.73
.516	.347	.248	.182	.121	.263	.266	.262	.262	.260	.249	.259
.70	.58	.74	.75	.80	0.65	0.61	0.63	0.62	0.60	0.61	0.60
+.23	+.08	+.11	+.01	+.05	+.05	+.01	+.03	+.02	.00	+.01	.00
N 70 W	N 38 W	N 60 W	S 72 W	S 82 W	N 76 W	N 41 W	N 48 W	N 56 W	N 60 W	N 61 W	N 41 W
1.38	1.89	3.17	3.82	4.94	2.49	1.34	2.03	2.11	3.32	2.24	1.59
4.75	7.06	6.66	7.64	9.98	7.40	7.13	7.33	7.47	8.55	8.17	7.64
—0.43	+1.52	+0.52	+0.17	+1.66	+0.54	+0.27	+0.47	+0.61	+1.69	+1.31	+0.78
5.060	2.508	3.321	3.765	2.045	29.486	26.483	25.529	26.995	23.434	33.274	28.051
+2.034	—1.222	+0.791	+0.617	+0.404	—0.469	—3.472	—4.426	—2.960	—6.521	+3.319	—1.904
16	11	22	11	9	132	130	118	136	130	127	131
...	...	Inap.	4.5	27.1	74.6	62.9	85.4	74.8	45.6	64.9	45.4
...	...	— 0.78	+ 1.38	+12.41	+11.24	— 0.46	+22.04	+11.44	—17.76	+ 1.54	—17.96
...	...	1	8	18	70	74	72	76	75	87	67
15	19	9	12	9	180	181	189	165	174	169	178
6	4	2	1	0	34	44	48	43	58	53	59
12	14	11	9	10	158	182	176	180	190	199	198
5	4	0	0	0	20	24	24	27	30	30	19

MONTHLY ABSOLUTE VALUES OF THE MAGNETIC ELEMENTS AT TORONTO, FROM 1856 TO 1864, INCLUSIVE.

BY G. T. KINGSTON, M. A.,
DIRECTOR OF THE MAGNETIC OBSERVATORY.

Declination.—The monthly values given in table I., are the means of six separate determinations, made at intervals during two or three consecutive days. Each determination includes five readings of the collimator scale, accompanied by simultaneous readings of the differential declinometer, by aid of which the corresponding partial determination was reduced to the monthly twenty-four-hour mean normal reading of the differential declinometer.

The mean monthly increase of westerly declination, derived by the method of least squares, from the 108 equations furnished by the monthly values of declination, is 0′·2606; which, if the rate of westerly movement increase equably, will be the monthly rate corresponding to 1st July, 1860. But on p. vi. of Vol. II. of the Toronto Observations, the monthly rate of westerly movement proper to 1st July, 1848, was 0′·1627: whence the mean annual increase in the monthly movement is 0′ 008 nearly. The probable error of a single monthly determination is 0′·74, and the probable error of the mean determination, 2° 10′·04, corresponding to 1st July, 1860, is 0′·071.

Table II. gives the monthly determinations of the dip, and Table III. those of the horizontal force, taken according to the method of which the details are given in the earlier volumes of the Toronto Observations. The determinations of the horizontal force are reduced to the monthly twenty-four-hour mean normal reading of the bifilar.

The monthly values (ϕ) of the total force in Table IV. are derived from those of the dip (θ) and of the horizontal force (X), by the formula $\phi = X \sec. \theta$.

For the purpose of exhibiting the progressive secular march in the magnetical elements from the commencement of the observations, the annual means, as far as they are procurable, are presented in one view in Table V.

Declination.—The annual means of the declination for 1841–42 are taken from p. xi. of Vol. I. of the Toronto Observations, and those for 1845 to 1851, from pp. iii. to v. of Vol. II. In 1853, 54, 55, several months occur in which the absolute declination was not determined. In these cases, the approximate annual means given in the table are the averages of the results for the months wherein observations were made, these results being corrected for annual and secular variation. These corrections were determined as follows: The twelve monthly means on the average of the nine years, 1856 to 1864, being in the first instance corrected for secular change, by the application to them of the several multiples of 0′.2606, from $+5.5 \times 0'.2606$ in January, to $-5.5 \times 0'.2606$ in December, were then subtracted severally from the mean declination 2° 10′.04, thus yielding remainders which have been adopted as the monthly *corrections* for annual variation. They are small, in no instance amounting to 0′.6. Assuming these corrections, as well as those for secular change, to be applicable to the years 1853, 54, and 55, with sufficient accuracy for the purpose in view, the corrections applied to any one of the monthly means, in order to reduce it to the mean of the year, was found by taking the algebraical sum of the correction for annual variation, and that for secular variation, supposing the latter to be $+5.5 \times 0'.2606$ in January, and to diminish each month by 0′.2606 till it becomes $-5.5 \times 0'.2606$ in December.

Inclination.—The annual means of inclination for the years 1841 to 1856 are reprinted from p. cxix. of the third Toronto volume. The increase of the inclination from the minimum in 1843–44 was arrested in 1855, from which year the inclination has been steadily diminishing.

Horizontal Force.—From 1845 to 1852, the annual means of the absolute horizontal force are reprinted from p. cxvii. of the third Toronto volume. The number given as the annual mean for 1855, is an imperfect approximation, being the average of the determinations in the four months, September to December. The progressive diminution in the horizontal force so apparent in the annual means prior to 1859—the year of maximum dip, has been converted since 1860 into an increase.

Total Force.—The annual means of the total force for the years 1845–52, as well as for 1855, are derived from the annual means of inclination and of horizontal force by the formula $\phi = X \sec. \theta$. For the years 1856 to 1864, the annual means are averages of the monthly values of the total force given in Table IV.

TABLE I.

Monthly determinations of the Absolute Declination at Toronto, from 1856 to 1864 inclusive.

MONTHS.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.
	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
January......	1 54.30	1 58.54	2 02.82	2 06.41	2 08.53	2 12.37	2 15.71	2 17.41	2 20.69
February.....	1 55.33	1 58.79	2 03.78	2 06.90	2 09.26	2 13.30	2 11.99	2 17.97	2 21.26
March.........	1 55.23	2 00.61	2 04.44	2 06.73	2 09.95	2 13.24	2 13.91	2 17.88	2 21.22
April..........	1 56.34	1 59.69	2 04.03	2 06.56	2 09.61	2 14.22	2 13.77	2 18.10	2 20.98
May............	1 56.12	1 58.85	2 03.72	2 06.84	2 08.93	2 13.17	2 14.44	2 18.51	2 21.20
June...........	1 56.09	1 58.89	2 03.54	2 06.90	2 08.93	2 13.93	2 16.73	2 18.93	2 22.58
July............	1 56.06	1 59.85	2 04.33	2 07.24	2 10.38	2 14 10	2 16.22	2 19.87	2 23.19
August........	1 54.44	2 01.86	2 06.34	2 07.39	2 11.36	2 14.71	2 15.91	2 19.87	2 22.71
September...	1 58.52	2 01.58	2 05.36	2 08.77	2 10.77	2 15.23	2 17.10	2 20.25	2 22.27
October......	1 57.06	2 01.69	2 05.27	2 08.52	2 13.91	2 15.04	2 17.41	2 19.67	2 22.28
November...	1 58.31	2 02.47	2 04.75	2 08.53	2 13.30	2 15.69	2 17.59	2 20.87	2 22.24
December...	1 57.57	2 03.67	2 05.52	2 08.27	2 12.62	2 17.24	2 17.18	2 19.67	2 21.94
Yearly Means.	1 56.28	2 00.54	2 04.49	2 07.42	2 10.63	2 14.35	2 15.66	2 19.08	2 21.88

TABLE II.

Monthly determinations of the Absolute Inclination at Toronto, from 1856 to 1864 inclusive.

MONTHS.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.
	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
January......	75 23.70	75 24.25	75 24.60	75 24.47	75 24.37	75 23.80	75 23.10	75 21.69	75 21.53
February.....	24.33	23.83	26.60	24.93	23.47	23.53	23.37	21.67	21.88
March.........	23.97	24.47	26.22	24.97	24.57	24.30	23.62	21.77	21.45
April..........	23.52	24.98	23.72	25.50	25.10	25.30	22.74	21.84	21.30
May............	22.72	23.93	23.87	24.37	24.27	24.33	23.33	21.94	21.34
June...........	23.62	23.90	22.85	24.60	23.37	23.40	22.77	20.93	21.22
July............	24.15	23.92	23.25	24.07	24.20	22.97	22.90	20.93	20.19
August........	23.80	23.93	23.73	25.07	25.07	23.70	23.78	21.76	19.61
September...	24.82	25.12	25.07	25.00	26.40	23.27	23.55	22.12	20.74
October......	24.87	25.02	24.50	26.43	26.00	23.80	23.85	20.99	20.53
November...	24.57	24.43	24.47	26.03	23.83	23.37	22.82	20.91	20.61
December...	24.55	24.10	24.43	24.27	23.93	23.27	22.43	21.14	20.79
Yearly Means.	75 24.05	75 24.32	75 24.44	75 24.98	75 24.55	75 23.75	75 23.19	75 21.47	75 20.93

TABLE III.

Monthly determinations of the Absolute Horizontal Force at Toronto, from 1856 to 1864 inclusive.

MONTHS.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.
January	3.5003	3.4868	3.4779	3.4724	3.4771	3.4843	3.4839	3.4882	3.4941
February	5064	4728	4748	4771	4842	4826	4834	4880	4932
March.........	5052	5113	4725	4752	4760	4829	4846	4875	4903
April	5054	4761	4870	4796	4767	4787	4922	4902	4905
May............	5057	4901	5010	4771	4862	4988	4867	4878	4923
June	5101	5025	4990	4793	4822	4836	4882	4897	4946
July............	5108	5002	5014	4828	4805	4872	4869	4931	4948
August	5070	5002	5005	5015	4778	4847	4839	4903	4914
September...	5037	4826	4951	4799	4790	4796	4840	4889	5060
October	5039	4823	4941	4842	4774	4817	4793	4889	4890
November ...	5046	4762	4865	4816	4769	4822	4819	4884	4915
December ...	4959	4783	4907	4825	4760	4803	4889	4881	4910
Yearly Means.	3.5049	3.4883	3.4900	3.4811	3.4792	3.4839	3.4853	3.4891	3.4932

TABLE IV.

Monthly determinations of the Absolute Total Force at Toronto, from 1856 to 1864 inclusive.

MONTHS.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.
January	13.8815	13.8367	13.8068	13.7829	13.8000	13.8195	13.8073	13.8026	13.8237
February.....	9157	7745	8252	8085	8141	8088	8093	8014	8255
March.........	9053	9373	8101	8016	7987	8217	8180	8009	8074
April	8989	8053	8290	8272	8097	8208	8344	8127	8056
May............	8878	8450	8870	7997	8345	8856	8222	8049	8135
June	9193	8935	8632	8120	8048	8107	8194	7968	8207
July............	9303	8847	8792	8177	8109	8185	8163	8105	8054
August	9099	8850	8829	9077	8135	8195	8180	8120	7835
September...	9123	8334	8824	8208	8389	7928	8147	8121	8582
October	9141	8305	8696	8602	8263	8096	8004	7945	7879
November ...	9123	7974	8386	8435	7908	8048	7952	7916	7993
December ...	8775	8005	8548	8198	7888	7957	8168	7938	7996
Yearly Means.	13.9054	13.8436	13.8524	13.8251	13.8109	13.8173	13.8143	13.8028	13.8109

TABLE V.

Annual Means of the Monthly determinations of the Absolute Declination, Inclination, Horizontal Force, and Total Force, at Toronto, to 1864 inclusive.

DECLINATION.				INCLINATION.				HORIZONTAL FORCE.				TOTAL FORCE.			
Years.	Means.	Years.	Means.	Years.	Means.	Years.	Means.	Years.	Means.	Years.	Means.	Years.	Means.	Years.	Means.
	° ′		° ′		° ′		° ′								
1841	1 14.3	1853(*a*)	1 46.1	1841	75 16.6	1853	75 22.2	1841		1853		1841		1853	
1842	1 18.9	1854(*b*)	1 48.0	1842	16.4	1854	23.0	1842		1854		1842		1854	
1843		1855 (*c*)	1 52.3	1843	14.7	1855	23.5	1843		1855(*d*)	3.5151	1843		1855	13.937
1844		1856	1 56.3	1844	14.8	1856	24.0	1844		1856	5049	1844		1856	13.905
1845	1 29.1	1857	2 00.5	1845	15.5	1857	24.3	1845	3.5443	1857	4883	1845	13.929	1857	13.844
1846	1 30.8	1858	2 04.5	1846	15.1	1858	24.4	1846	5381	1858	4900	1846	13.898	1858	13.852
1847	1 33.2	1859	2 07.4	1847	15.3	1859	25.0	1847	5342	1859	4811	1847	13.886	1859	13.825
1848	1 35.4	1860	2 10.6	1848	18.3	1860	24.5	1848	5299	1860	4792	1848	13.915	1860	13.811
1849	1 36.9	1861	2 14.3	1849	18.8	1861	23.8	1849	5328	1861	4839	1849	13.934	1861	13.817
1850	1 38.6	1862	2 15.7	1850	20.0	1862	23.2	1850	5280	1862	4853	1850	13.934	1862	13.814
1851	1 40.9	1863	2 19.1	1851	20.4	1863	21.5	1851	5255	1863	4891	1851	13.930	1863	13.803
1852		1864	2 21.9	1852	20.5	1864	20.9	1852	5110	1864	4932	1852	13.874	1864	13.811

(*a*) From determinations in July and August.
(*b*) From determinations in February, March, April, and June.
(*c*) From determinations in August to December, both inclusive.
} Corrected for annual and secular variation.

(*d*) From determinations in September, October, November, and December.

REVIEWS.

An Account of the Smithsonian Institution, its Founder, Building, Operations, etc., prepared from the Reports of Prof. Henry to the Regents, and other authentic sources. By William J. Rhees, Chief Clerk of the Smithsonian Institution. Washington: 1863.

Annual Reports of the Board of Regents of the Smithsonian Institution, showing the Operations, Expenditures, and Condition of the Institution for the years 1857–1862.

On the 26th of May, 1786, James Louis (or Lewis) Macie, a member of Pembroke College, Oxford, proceeded M.A. at that University. In the following year he was elected a fellow of the Royal Society; and in 1791 his first communication appeared in the *Philosophical Transactions* under the title: "Of some Chemical Experiments on Tabasheer;" a mineral substance extracted from the pith of the bamboo, and in many respects nearly identical with quartz, or common siliceous earth. According to a recent very meagre biographical notice in the *New American Cyclopædia*, his mother was Mrs. Elizabeth Macie, heiress of the Hungerfords of Audley, but this is probably a mere re-affirmation, in modified form of his own statement, to which we shall presently refer. He was at any rate a man of independent fortune, and, according to an obituary notice in the *Gentleman's Magazine*, "continued to enjoy the property of the Macies," till his death; when it was bequeathed in a way calculated to perpetuate his name as the founder of an institution of world-wide interest. But the name so perpetuated was not that of James Louis Macie. In 1803 a second paper, by the same author as that on the chemical experiments on Tabasheer made its appearance, entitled "A Chemical Analysis of some Calamites." But with the new century the inheritor of the Macie property had seen fit to abandon that name; and thenceforth, in philosophical transactions and elsewhere, he chose to be known as James Smithson. The only reasons which he appears to have assigned for this change, are thus set forth in the autobiographic note, with which his will is introduced: "I, James Smithson, son of Hugh, first Duke of Northumberland, and Elizabeth, heiress of the Hungerfords of Audley," or, as the *Gentleman's Magazine* has it, "of Studley," "and niece to Charles the proud Duke of Somerset."

The authority for the maternal ancestry of Smithson, as set forth in the *New American Cyclopædia* is probably nothing more than an adaptation of this testamentary autobiographic note; as other statements with which it is accompanied are not only vague but inaccurate. That James Smithson was a son of the first Duke of Northumberland is very possible; though if so it must have been in such a way as renders his change of name in mature years a curious assertion of an alliance that added the bend sinister to any heraldic honours he might thereby claim. Who the Macies were, whose property he enjoyed, or what was his actual relation to them, no where appears, so far as we are aware, in any authentic notice of him. They are said to have resided at Weston, near Bath, where, possibly, tradition or local histories preserve information which might be welcome to those who are curious about the biography of this singular man. It cannot be justly charged as a mere vulgar curiosity that would crave for further knowledge of the eccentric and scholarly recluse, who occupied offices of honourable distinction among the foremost scientific men of his day, and was spoken of from the chair of the Royal Society, when death had removed him from its roll of Fellows, as " distinguished by the intimate friendship of Mr. Cavendish ;" and again as one who "rivalled our most expert chemists in elegant analyses."

It is sufficient to say, in reference to Smithson's claim to ducal paternity, that if Elizabeth, heiress of the Hungerfords of Audley, and niece to the proud Duke of Somerset, was his mother; the wife of Hugh, first Duke of Northumberland, was the lady Elizabeth Seymour, daughter of Algernon, Duke of Somerset; and no niece, but a grand-daughter of Charles, Duke of Somerset, to whom the appellation of "the proud Duke" was applied. There is mystery, and probably also romance, in the story thus curiously complicated by the change of names, and the claim of a noble maternity, so unlikely to be associated with illegitimacy in any ordinary fashion. But at any rate it is sufficiently obvious that the claimant of such descent, however derived, who lived to bequeath inherited property sworn under £120,000 sterling, was manifestly no ordinary foundling. There is something curious also in a grave physicist of mature years, moving in the society of men alike distinguished for scientific and social rank, and accustomed to minutest observations of scientific evidence, gravely setting forth testamentary claims of ducal descent, which he knew that every one who chose to be at the trouble to turn over the pages of a *peerage*, could ascertain to be false.

One fact, however, rests on the indisputable authority of Mr. Davies Gilbert, President of the Royal Society; and it is this: that Smithson enjoyed the intimate friendship of the Hon. Henry Cavendish, who could trace an unbroken pedigree, through Sir John Cavendish the Lord Chief Justice of Edward III. back to an ancestry of Norman blood, famous in the days of the Conquest; but whose claim to the memory of this later generation rests on the better foundation of his distinction among the English philosophers of the eighteenth century, when Watt, Priestley, Woolaston, Davy, Black, and Thompson along with Cavendish, were adding lustre to English science by their brilliant discoveries in chemistry, and the kindred sciences. But to have been the intimate friend of the high born British Chemist, implies some very peculiar traits in the possessor of such a claim to our notice. Cavendish was a recluse, scarcely less difficult of access than some eremite dwelling in desert haunts, remote from human kind. Such was his extreme reserve and love of retirement, that though for half a century a distinguished fellow of the Royal Society, a member of the French Institute, and a student of science who had won a European reputation: yet his modern biographer* found it almost as difficult to recover any detailed materials for his life, as is now the case in reference to our less famous student of physics. By the time that Smithson began to take an active part in the proceedings of the Royal Society, Cavendish had his town residence in Montague Place, close to the British Museum, where the few visitors who were able to penetrate into the domestic sanctuary of the scientific recluse, have left on record that books and apparatus constituted its chief furniture. A suburban villa at Clapham, which formed his favourite residence, was in like manner occupied throughout with workshops, laboratory, astronomical, meteorological, and electrical apparatus. There his rare guests invariably found the same homely fare. According to the information supplied to his biographer by a Fellow of the Royal Society, the dinner table was provided with a leg of mutton, and nothing more. On one occasion when four scientific friends were engaged to dine with him, his housekeeper remonstrated against the invariable bill of fare: that a leg of mutton would not be enough for five. "Well then, get two," was the reply. One can fancy Smithson as one of the five, who, at this homely board, talked over the favourite themes on which they meditated in common; and speculated, with unimpassioned stoicism, on such laws of the universe as engaged their thoughts. Professor Playfair, who had met with Cavendish at the Royal Society Club, describes him as awkward in appearance, speaking very seldom and with great hesitation. "But," he adds, "the gleams of genius break often through this unpromising exterior. He never speaks, but it is exceedingly to the purpose; and either brings some excellent information, or draws some important conclusion," Smithson, one is tempted to fancy as little less shy and reserved; though with him some at least of the originating causes were very different. The Honourable Henry Cavendish was of untarnished ducal descent by both parents; and related by near propinquity to others of the most illustrious among England's ancient nobility. Smithson betrays in his will the nature of the wound, which, rankling in his breast, may have made of him the reserved, silent student of science, fitted by his retiring exclusiveness to be the friend of the misanthropical patrician Chemist, who shrunk from the society of his fellow men; had little intercourse with his noble relatives; and is reported by his contemporaries to have had a positive dislike to women. It is probable, however that his biographer is nearer the truth when he suggests that he did not hate women, but was only awkwardly shy and afraid of them.

---

* *The life of the Hon. Henry Cavendish, including abstracts of his more important Scientific papers, and a critical inquiry into the claims of all his alleged discoveries of the Composition of Water.* By George Wilson, M.D., F.R.S.E. London: 1851.

But Smithson,—who commences his will with the assertion of a ducal descent on both sides, not less noble than that of Cavendish,—in one of the clauses of his will bequeaths the whole of his property to a nephew, the son of his brother, "Lieut. Col. Charles Louis Dickenson." The name adds fresh complication to the question of his family relations: with the "Louis" which he dropped along with the surname of his earlier years, reappearing as the only element common to both. But the significant clause is superadded, that in case of the death of this nephew, the whole property is to go to any children of his, "legitimate or illegitimate." But neither nephew, nor nephew's children, survived to claim the property of the old man. He had at one time, it is said designed making the Royal Society the administrator of his wealth; but his co-fellows offended his touchy, sensitive nature in some way; and after providing a small annuity for John Fitall a faithful old servant, and extending the terms of a loan to H. H. Sailly, also formerly in his service, but who is described as "now keeping the Hungerford Hotel in Paris;" he transferred the whole of his estate "to the United States, for the purpose of founding an Institution for the increase and diffusion of knowledge among men." The name adopted by Smithson's former servant for his Parisian hotel is, in all likelihood, another index of the sensitive assertion by his master of descent from the noble heiress of the Hungerfords of Audley, and so designed to gratify him by an acceptable humouring of his known weakness on this point.

Without domestic ties, and frequently apparently without any fixed home in England, he appears to have travelled on the continent, staying once and again a year or two in Paris, Berlin, Florence, &c., and spending his later years chiefly abroad. Occasional glimpses of his wanderings are still recoverable from his scientific memoirs; as when in communicating to the Royal Society, in 1813, some analytic experiments on a substance from Mount Vesuvius, he remarks: "The present saline substance was sent to me from Naples to Florence, where I was, in May, 1794."

Smithson's last communication to the Royal Society was made in 1818, and is entitled "A few facts relative to the colouring matter of some vegetables;" but reference to this paper shows that he had then abandoned all active labour as an experimental physicist. "I began," he says, "a great many years ago, some researches on the colouring matters of vegetables. From the inquiry being to be prosecuted only at a particular season of the year, the great delicacy of the experiments, and the great care required in them, and consequently the trouble with which they were attended, very little was done. I have now no idea of pursuing the subject. In destroying lately the memorandums of the experiments which have been made, a few scattered facts were met with which seemed deserving of being preserved. They are here offered, in hopes that they will induce some other person to give extension to an investigation interesting to chemistry, and to the art of dying;" and so, apparently, closes the scientific labours of Smithson. He was probably then destroying papers, preparatory to one of his long sojourns in other lands. The date of his will, 23rd October, 1826, shows him in London, resident in Bentinck Street, Cavendish Square; but when his death took place, less than two years thereafter, he was again a wanderer, with so uncertain an abiding place at the close of his life, that the biographical notice in the *Gentleman's Magazine* states him to have died in the south of France, while a notice attached to the *Guide to the Smithsonian Institution and National Museum,* assigns Genoa as the place of his decease.

Smithson, as the friend of Cavendish, was—as may be presumed, not without some support from the imperfect glimpses we thus recover of him,—one to whom intimate intercourse with society at large was far from acceptable. But in another, and more interesting respect, he bore some resemblance to the great English chemist. He was singularly delicate in his scientific operations; and among his personal effects, deposited in the Regents' Hall, at Washington, are the miniature apparatus and laboratory with which he was wont to pursue his experiments as an analytic chemist while travelling either at home or abroad. He was referred to by Mr. Davies Gilbert, when noticing the blanks which death had made, by the removal of him and other recently deceased Fellows of the Royal Society, in the last address delivered by him from its presidential chair; and he then spoke of him as one unsurpassed in expertness and analytic skill among contemporary chemists. In illustration of his "elegant analyses," one romantic incident is referred to as proof of his skill. Happening, it is said, to observe a tear gliding down a fair lady's cheek, he started forward to catch it in a crystal vessel, ere it fell. Half of the falling tear escaped; but what remained was submitted by him to minute analysis, and enabled him to determine the nature of its included salts.

In the case of Cavendish, the sight of a strange face, even at the Royal Society Club, where he appears to have been most at his ease, was sufficient to strike him dumb. Such was his excessive shyness, that one of his contemporaries describes him as standing on the landing, at Sir Joseph Banks' presidential *soirées*, evidently wanting courage to open the door and face the assembled Fellows; and only entering at last, when the sound of footsteps behind compelled him to avoid the approaching company by escaping into the crowd. Shrinking as he thus did from the society of his own sex, it would be curious and interesting to ascertain to what extent the statement of Smithson's intimate friendship with him, which rests on authority so worthy of credit, is actually borne out by any existing evidence; and, if so, how far it was traceable to similarity in disposition and temperament, as well as in scientific tastes. In one respect, however, they must have differed. Shy and reserved as Cavendish was among his fellow men, he literally fled from the gaze of a woman. So far did he carry this that Lord Burlington notes of him, "he would never see a female servant, and if an unfortunate maid ever shewed herself, she was immediately dismissed." One can hardly, therefore, fancy him, even under the most urgent stimulus of analytic zeal, snatching the falling tear from a lady's cheek.

In another respect, also, Smithson would appear to have differed from his illustrious friend, if his American biographer may be relied upon. "He was," says the notice appended to the Guide Book already referred to, "of a sensitive, retiring disposition; was never married; but appeared ambitious of making a name for himself." This, however, I suspect is a mere inference, and is not borne out by the terms of his will, which primarily destined his property to any collateral, and even illegitimate surviving relation, and accompanied the ultimate bequest to the United States with no ostentatious obligations, beyond the mere determination of the name of the establishment to be founded at Washington as the "Smithsonian Institution." To the pecuniary trust he did, indeed, add certain gifts of a more personal character. His American executors not only acquired by his will the ample funds left at his death, but also received in trust his whole personal effects; and among the latter were books, papers, scientific apparatus, and minerals, all illustrating his tastes, and furnishing important contributions towards a better knowledge of the man. The Institution is, or at least, was, in possession of two likenesses of Smithson: one a portrait of him while a youth, in his academics as an Oxford undergraduate; the other a medallion profile, from which the engraving has been executed which is attached to all the Smithsonian "Contributions to Knowledge." The first was procured from the widow of his servant, John Fitall, and the latter passed directly, along with his other personal effects, to the United States.

In the annual report of the Board of Regents for 1857, the following information is communicated with reference to Smithson's personal effects:—"The bequest of James Smithson included all his personal effects, and these were obtained by the Hon. Richard Rush, the agent of the American Government, through whom the legacy was procured. They were delivered by him to the Secretary of State and afterwards deposited in the museum of the Patent Office, where they remained until the last year, when they were transferred to the Regents' room in the Smithsonian building. They have been arranged for exhibition in a large case of black walnut, and now form an interesting portion of the collections of the Institution. They consist of a very extensive series of rare though minute specimens of mineralogy; of the table service of plate of Smithson; and of the portable chemical and mineralogical apparatus with which he made his investigations. Besides the above mentioned articles, the Institution has had in its possession for several years the library of Smithson, containing 115 volumes, and a collection of manuscripts, principally consisting of what would appear to be the materials of a philosophical dictionary."

The collection of personal effects of the founder of the Smithsonian Institution is even more curiously minute than the above notice indicates. When last we visited the Smithsonian galleries at Washington, there were displayed in the Regents' Room not only the founder's minerals, chemical laboratory, balance, thermometer, and other scientific apparatus, but his sword, riding whip and walking cane, his candlesticks, travelling portmanteaus, snuff box, and umbrella.

In the report of 1857 it is justly added in reference to those varied personal relics of Smithson: "The whole collection taken together serves to exhibit the character of the man, and clearly to indicate his intention as to the nature of the Institution to which he gave his name. It serves to strengthen the conviction, if anything of this kind were needed, that the proper interpretation of the will has been given by the Regents in adopting the plan which makes active operations, the discovery of new truths, and a diffusion of these among men, the prominent object of the establishment. In this connexion it may be interesting to repeat a statement made in a former report, that the Institution is in possession of two likenesses of Smithson: one, a portrait of him while a youth, in the costume of a student at Oxford, the other a medallion, from which a steel engraving has been executed. The first was purchased from the widow of John Fitall, the servant of Smithson, and the other was among his effects, and identified by a paper attached to it, on which the words 'my likeness' were written in Smithson's own hand."

In the same report, the Regents add this remark:—"A list of the papers published by Smithson, and a record of all the facts which could be gathered in relation to him, have been made, to serve hereafter for a more definite account of his life and labours than has yet appeared." It would appear, therefore, to have been in contemplation to prepare an extended biographical notice of the founder of "the Smithsonian Institution." And this seems to us no more than is due to Smithson by those who have assumed the responsibility of his executors for the world at large. He cannot be looked upon as the mere vulgar millionaire, bequeathing a wealth he could no longer use, in order to gratify his vanity by some costly charity destined to perpetuate his name. As a man of science his contributions to physics do not greatly enlarge our knowledge, or add materially to the resources by means of which chemistry and the kindred sciences have made such rapid strides in modern times; but they show him to have been a willing fellow labourer with some of the great men who confer so brilliant a lustre on the early years of the present century; and that under circumstances of abundant wealth, and peculiar social relations little calculated to have tempted him into the paths of scientific investigation, had his tastes not lain very specially in that direction.

But eight years have elapsed since the notice of Smithson's papers and other personal effects was inserted in the Regent's Annual Report; and the present year has been signalised by a disastrous conflagration, in which it is to be feared that the unused materials for the purposed biography may have vanished, with whatever secrets they contained. On the 12th of January the electric wires flashed across the continent the following unwelcome intelligence:—

"This afternoon, about three o'clock, a fire broke out in the Smithsonian Institution building, in the loft above the picture gallery, between the ceiling and the roof, caused, it is believed, by a defective flue. The ceiling soon fell in, and in a few minutes, the gallery was one sheet of flame. The fire, as it mounted the central tower and burst forth in full volume from the main roof, was magnificently grand, and a curious spectacle was presented by the steadiness of the revolution of the anometer, or wind register surmounting the tower, while the fierce flame was ravenously mounting to its destruction. The windows of the picture gallery soon burst out, disclosing only the shell of the room. There were some 200 of Stanley's pictures here. He had negociated for their sale to the Michigan University. Only five or six of them were saved. The loss is very serious, including the lecture room, the philosophical instrument apartment, and most of the valuable instruments. The offices in the towers, and the originals of the private records and archives of the Institution, were destroyed. The top of the principal tower and several of the battlements fell. The conflagration was nearly altogether confined to the main building, and above the first story. The latter contained the Museum, which was damaged more by water than fire."

We know not whether the lost records and archives referred to included Smithson's papers and other personal effects; but, from the position of the Regents' Room, adjoining the centre of the main building, and above the ground floor, it is to be feared that the materials so essential to any minute biographical record of the founder of the Institution have perished, along with the valuable ethnological picture gallery, and so much else which has fallen a prey to the devouring flames.

In an early volume of this Journal*, a valuable paper, from the pen of Professor Henry, was printed, devoted to the subject of Acoustics, as applied to public buildings; and an interesting communication was contributed to a subsequent volume† by the learned professor, with views and ground plans, illustrative of the manner in which the principles and conditions previously investigated by him, along with his colleagues, Captain Meigs and Professor Bache, had been practically applied in the lecture room of the Institution buildings. In adapting this to the special requirements of a public theatre for the display of scientific experiments, and the delivery of lectures to large audiences, the principles of acoustics had been applied with rare success; so that a lecturer could address an audience of upwards of two thousand persons, and make his voice heard distinctly in the remotest corner without effort. This admirably constructed scientific theatre, we regret to see, has perished along with other parts of the main building. But the principles on which it was so successfully adapted to the required purposes, are, happily, beyond the reach of such elements of destruction; and have been applied, with equally satisfactory results, in some of the recently completed legislative halls in the new wing of the Capitol, at Washington.

In some respects the news of the destruction, not only of the

---

[*] *Canadian Journal*, Vol. II., p. 130.

[†] *Ibid*, Vol. III., p. 110.

fine lecture room, but of the whole costly building erected on "The Mall," at Washington, might be received with less regret than would ordinarily pertain to the loss of an edifice specially set apart for such purposes as it was devoted to; for the building, with its lecture room, galleries, library, and museum, was the practical exposition of ideas relative to the application of the founder's bequest, which many looked upon with apprehension, as destined to squander the fund on purely local and popular purposes. One class of advisers advocated the founding of a large library at Washington, on which the whole bequest should be expended. A great public museum in the same city found another equally zealous body of advocates. A third class proposed to devote the fund to secure the services of lecturers, whose prelections on science and literature should be extended to all the chief cities throughout the States. The advice of a fourth class was urged in favour of a series of popular tracts, to be published and distributed among the million. It is a subject of gratulation frequently referred to in notices of the Institution, that the bequest of Smithson was brought over from England in British sovereigns, and these, after being deposited in the United States Mint, were recoined into American eagles, and so converted into part of the currency of the country. But, so far as the special destination of the bequest had been indicated by the testator, it seemed to run no slight danger of being frittered away on ephemeral popular gratifications, and effectually lost to its purpose of increasing and diffusing knowledge throughout the world. The Act of Congress which determined, as far as legislation has done so, the mode of carrying out the trust, aimed, apparently, at a compromise between the various conflicting schemes. It directs the formation of a library, a museum, and a gallery of art; authorizes the delivery of courses of public lectures; and provides for the erection of a building, on a liberal scale, to supply the accommodation requisite for all those varied purposes.

The building, which has to a great extent perished in the recent conflagration, was the first result of this Act of Congress. It is described in the Guide Book as a structure "in the style of architecture of the last half of the twelfth century, the latest variety of the rounded style, as it is found immediately anterior to its merging into the early Gothic, and is known as the Norman, the Lombard, or Romanesque." In reality, however, it might rather be described as an attempt to adapt the details of the massive and sombre Romanesque architecture of the twelfth century, to the light proportions, elevated towers, and clere-stories of the latest perpendicular, as it merged into the florid Tudor Gothic. The result was one on which the architectural critic could look with little satisfaction; while the scientific student was compelled to note everywhere in its interior, obtrusive evidences of the practical requirements of a scientific gallery and museum sacrificed to the efforts of the architect at mere picturesque display. The admirable lecture room was, indeed, an exception to this; but its merits were in no respect due to the architect: whose original plans for such a room, occupying one half of the first story of the main building, had to be abandoned, owing to its obstruction by rows of Gothic columns rendering it impossible to apply those acoustic principles which ought to have the foremost place in the consideration of the architect, but which appear for the most part either to be deliberately ignored by the whole profession, or at best to be rendered wholly subordinate to mere ornamental effect: even where the subject of such misplaced decoration is a church, a lecture room, or a college hall.

To the neglect of all practical considerations of climate, or special adaptation, on the part of the architect, the destruction of the costly edifice at Washington is clearly traceable. Had the building been what it professed to be: a reproduction of the solid masonry, massive piers, and small round-headed lights of the twelfth century, it would at least have been adapted to the severity of an American winter. In the Report addressed by Professor Henry to the Board of Regents in 1858, after referring with regret to the fact "that the interest of the money expended on the building would have been much more efficiently applied in the development and publication of new truths," he goes on to say: "The changes which have been necessary on the building, to accommodate the increasing operations of the Institution have involved considerable expense. The corridors, which were entirely open to the north-west wind, have been enclosed with glazed sashes; a large amount of space has thus been rendered available, and a considerable portion of the interior of the building protected from the inclemency of the weather." He then proceeds thus:—"The heating of the building is a heavy item of expense, and must continue to be so until double windows can be furnished, particularly on the north side, and a more economical as well as efficient method of warming be adopted. The smaller rooms are mostly heated by stoves, and the larger ones by furnaces. Estimates have been procured for substituting hot water apparatus, but the expense of introducing this method is so great that we would hesitate to advise its adoption at present." Temporary expediency and prudential reasons have no doubt continued to prevail, until the recent fatal results demonstrated that it was a false economy to delay grappling with the evil. It is one with which all institutions requiring extensive accommodation find it peculiarly difficult to deal, and which has already involved the loss of many valuable libraries, museums, and galleries of art, on this continent.

The Smithsonian bequest was still hanging in unstable equilibrium between the various schemes which we have indicated above, propounded for its expenditure, when it fortunately passed to a great extent under the judicious control of Professor Joseph Henry, to whom, as secretary of the Institution, the scientific world is mainly indebted for the wise and beneficial expenditure of the income in the publication of the series of "Contributions to Knowledge," now extending to thirteen quarto volumes, embracing valuable monographs on Archæology, Geology, Philology, Meteorology, Mathematics, Natural History, &c.; in addition to the series of octavo "Miscellaneous Collections," devoted to meteorological and physical tables, directions for observations, and special reports; and thirdly, the Annual Reports, printed at the expense of the United States Government, but including reports or abstracts of the scientific lectures delivered at the Institution building, and selections and translations, chiefly from foreign scientific periodicals.

In the plan for the administration of the trust, chiefly, if not wholly due to the wise foresight and liberality of Professor Henry, the objects of the Institution are defined as:—1st, to increase, and 2nd, to diffuse knowledge among men; and in one of the general considerations set forth as a guide to the just fulfilment of the duties of the Board of Regents, it is remarked: "It should be recollected that mankind in general are to be benefited by the bequest, and that therefore all unnecessary expenditure on local objects would be a perversion of the trust." The increase of knowledge is accordingly proposed to be effected by stimulating men of talent to carry out original researches, and offering rewards for memoirs embodying new truths; while the different series of publications already referred to, are the exponents of the second part of the plan, whereby the diffusion of knowledge is secured.

The principles thus established in relation to the future expenditure of the income derived from the investment of Smithson's bequest, will, it may be hoped, continue to regulate its application hereafter; and valuable as are the ethnological and natural history collections already accumulated at Washington,—in so far as they have escaped the recent destructive conflagration,—we cannot evade the conviction that all such purely local expenditure of the fund is at variance with the cosmopolitan aims of the founder, and the consequent obligations assumed by the United States in undertaking the administration of the bequest "for the increase and diffusion of knowledge among men." The jealousy with which the special administrators of the fund are seen to guard it against all attempts to divert it from its legitimate channels, is deserving of the highest appreciation. In 1861, when "the threatening aspect of political affairs" jeopardised so many interests, the secretary is found thus addressing the Board of Regents: "We trust that there is honesty, intelligence, and liberality sufficient in this country, whatever may be its political condition, to safely guard the bequest which was entrusted with unhesitating faith to the people of the United States for the good of mankind." Had, indeed, the funds been left by some Gerrard, Astor, Lowell, or other naturalised or native-born citizen of the Great Republic, the diversion of a portion of the income to the adornment of Washington, and the instruction and gratification of the citizens who reside, or annually resort to the seat of federal legislation, might have seemed less inconsistent with a liberal construction of the terms of the bequest; but when it is borne in remembrance that the endowment was left by a foreigner, a man of science, and an active member of the Royal Society of London: who, after meditating the disposition of the fund by his survivors in the Council of that Society, finally selected the government of a remote country, to which, though a frequent traveller, he was a stranger, as the trustee and administrator of his will: the citizens of the Republic will have reason hereafter to acknowledge no slight obligations due by them to the liberal minded and indefatigable secretary of the Smithsonian Institution for the wise firmness and sagacity with which he has maintained the honour of his country in the execution of so delicate and peculiar a trust.

The difficulties with which the Board of Regents has to contend are of a multifarious and shifting kind. At one time they are found complaining of "the cost of keeping up a reading-room in which the light publications of the day, obtained through the copyright a w are perused principally by young persons." At another time their grievance is that they are forced to become the recipients and custodiers of a strange variety of live animals forwarded by government and private explorers, including "two bald eagles, monkeys, two wild cats, a jaguar, and a large grizzly bear from the rocky mountains!" The latest printed report is that for 1862, though including some early proceedings of 1863; but its novel grievance indicates the change of circumstances, which has, no doubt, contributed to delay the issue of any later report. In it Professor Henry is found in correspondence with Edwin M. Stanton, Secretary at War, in reference to thirty-three boxes and one bundle of books, maps, papers, and other articles, taken by the United States forces in South Carolina, and forwarded to the Smithsonian Institution by the Transportation Company; and also the library of Bishop Johns, brought in loose volumes, by army waggons, from Alexandria. Of those the Board of Regents are required to become the curators "until the termination of the present war;" and the Secretary reports his interview with the War Secretary, relative to the important question of funds for defraying the expenses incident to such an unexpected mode of increasing and diffusing knowledge among men.

It is curious indeed, and still more sad, to perceive in how many ways the terrible evils incident to warfare involve in their remote results the most beneficent cosmopolitan institutions, disturbing the quiet student in the retirement of his study, and converting the laboratory and work-room of the peaceful man of science into workshops of war. The Smithsonian Institution, administering the bequest of a deceased man of science for the benefit of the civilised world, might seem peculiarly protected from the recoil of foreign or domestic strife; yet, on the 31st of January, 1863, the Board of Regents is found recording this resolution: "That the secretary be directed to inform the Congress of the United States, that George E. Badger, one of the Regents of the Institution, has not attended the recent meetings of the Board, and they are advised that he is now in rebellion against the Government of the United States, and submit whether the name of said Badger should longer remain on the list of Regents of said Institution." Most earnestly do we hope that the time is not far distant when the renewed activity of the Smithsonian Institution, and of all other societies throughout the United States devoted to science and letters, will afford gratifying evidence that the marvellous energies which have been displayed with such indomitable perseverance in war, are once more enlisted in the nobler arts of peace; and are directed, in the spirit with which the plan of organisation of the Smithsonian Institution has been so wisely imbued by its able secretary, for the diffusion of knowledge, and the benefit of mankind. D. W.

THE HAIRY MEN OF YESSO.

Glasgow Citizen, 7th January, 1865.

An interesting communication was read at last meeting of the Ethnological Society, the writer of which was Mr. W. Martin Wood, and the subject "The Hairy Men of Yesso." The Island of Yesso is the most northern portion of the empire of Japan. These aborigines are named "Aïnos," or "Mosinos"—the "all-hairy people"—this last being a Japanese term which marks their chief physical peculiarity. Their number is estimated at about 50,000. Yesso is only separated from Niphon by the narrow Strait of Tsougar; but the climate of the island is unpropitious and its soil is barren, so that the Japanese have only occupied the southern portion. They number about 100,000, and dwell principally in the cities of Matsmai and Hako-dadi. The former city is the residence of the feudatory prince who holds Yesso under fealty to the Tycoon of Jeddo. To this prince of Mats-mia the Aïnos send a deputation every spring, who present a tribute of dried fish and furs, and do homage, and repeat a formal convention expressive of submission to the Japanese. Hako-dadi is the largest city of Yeddo, and is the third Japanese port opened to foreign commerce. Its roadstead and harbour are the safest and most commodious of any in the eastern seas. It affords an excellent port for the refitting of merchant vessels, especially for the American whalers, and it also forms a good rendezvous for the naval vessels of the various trading powers. From a temple in the centre of the city float the flags of England and France, and there the consuls of those powers reside. The Aïnos live quite in the interior of the island and seldom show themselves at Hako-dadi or Mats-mai. Of a timid and shrinking attitude, these people seem utterly crushed in spirit by their long subjection and isolation. They are short in stature, of thick-set figure, and clumsy in their movements. Their physical strength is considerable, but, besides that peculiarity, there would seem to be nothing by which an observer can recognise the possibility of the Aïnos ever having possessed any martial prowess. The uncouthness and wildness of their aspect is calculated at first to strike a stranger with dismay or repugnance. Esau himself could not have been a more hairy man than are these Aïnos. The hair on their heads forms an enormous bunch, and it is thick and matted. Their beards are very thick and long, and the greater part of their face is covered with hair, which is generally dark in colour; but they have prominent foreheads and mild dark eyes, which somewhat relieve the savage aspect of their visage. Their hands and arms—and, indeed, the greater part of their bodies—are covered with abnormal profusion of hair. The natural colour of their skins is somewhat paler than that of the Japanese, but it is bronzed by their constant exposure. The women of the Aïnos, as if in default of the extraordinary endowments of their spouses, have a custom of staining their faces with dark blue for a considerable space around their mouths. The children they generally carry in a very singular fashion over their shoulders, and during a journey these tender charges are placed in a net and slung over the backs of their mothers. The children are lively and intelligent when little, but soon acquire the downcast aspect of their elders. Yet these strange people have a history, and, though its details are lost, they cherish the remembrance that their forefathers were once the equals, if not the masters, of the Japanese. This is supposed to have been in the sixth century before Christ, at a period coeval with the reign of the first Mikado of Japan. The Aïnos were then masters of the northern provinces of Niphon; but they appear to have become dispossessed of their land by the Japanese, and then were gradually driven across the Strait of Tsougar into Yesso. Their final subjection was not accomplished until the close of the 14th century, when they were completely overcome by a Japanese general, and compelled to render tribute at Jeddo. As to the origin of the Aïnos, we believe the whole college of ethnologists are at fault. They have no written characters, but have had their rude bards or sagas, who, in verses orally transmitted, have kept alive the memory of their ancient heroes and their exploits on mountain and flood. The world will not quite lose these wild strains, for a French missionary, the Abbé Mermet, is preparing a translation of them. The language itself has already been collected, thanks to the perseverance of a Japanese official, who has compiled a glossary of the Aïnos tongue rendered into his own. This zealous linguist deserves to have his name recorded, and it is a sufficiently remarkable one, being Jasherotsona-notske. Possibly the Aïnos tongue may have in it some valuable hints for professors of mnemonics. One of its chief characteristics appears to be a clumsy principle of repetition. Thus the numerals are compound and carry one syllable all through—as chena-ppou, one; so-ppou, two; re-ppou, three; eunes-ppou, four; oskina-ppou, five, and so on. Their name for the sun is baikrets-housoup, and for the moon knonnats-housoup; for water they have ba, and for hand, tekke. Probably the European public may shortly receive from the Abbé Mermet a translation of the Aïnos-Japanese dictionary. It is some evidence of the former influence of the Aïnos in Niphon that the Japanese have adopted several of the Aïnos words in the spoken language of Japan. The rude mythology of the Aïnos is connected on some obscure principle with the animals of the chase and the monsters of the deep. The bear is their chief divinity, although they slay that animal whenever they can accomplish such a feat. In the process of dissecting the carcase they endeavour to conciliate the deity whose representative they have slain, by making elaborate obeisances and deprecatory salutations. The head they always reserve, and place it outside their habitations as a sure protection against misfortune. From the Japanese they have adopted some few Bhuddist notions, but their native theology mainly belongs to the class of fetiche worship. All tribes of men have some tradition of the origin of the race. That held by the Aïnos places a woman as the first of our race; and she came, as they say, from the west. This was soon after the world was formed out of the waters, which is the Genesis taught in their cosmogony. The Aïnos know of no land except islands; so that really this might be the form which tradition has taken since that remote period when the isles of Japan and the Kuriles were forced up, as they appear to have been, by volcanic action from the ocean bed. The Aïnos tell how this woman, the first of the race, floated over the waves in a vessel which was freighted with bows and lances, with nets and lines, and all things necessary for the chase and fishing. She landed on an island where was a beautiful garden, and in it she dwelt alone and happily for a long period of years. That garden still exists, say they, but no living man has yet been able to find it. The close of this reign of single blessedness, so long enjoyed by this the first of the amazons, was brought about by a singular circumstance, which, however, can scarcely be narrated here. There is not, as in most legends, the record of a broken commandment; though transgression of some kind is implied, the change being connected with the loss of the garden and the increase and dispersion of the race. These events followed after the advent of a self-imposed protector, whom the lady of the island, in a period of weariness, permitted to enter and share in her solitude. The Aïnos are extremely hospitable, and are even eager to place at the disposal of their visitors all their little stock of provisions, their dried fish and furs. Besides the implements and spoils of hunting and fishing, there is little wealth of any kind in their habitations. The Aïnos formerly were monogamists, but now, when their resources admit of it, they imitate the Japanese practice of polygamy. In their marriage ceremonies they also imitate those of their conquerors. Like most other degenerate races, the Aïnos have acquired a taste for tobacco and alcoholic drinks; of the latter they use sak-ki, an intoxicating draught made from rice.

REMARKABLE PHOTOGRAPHIC EXPERIMENTS.

From Glasgow Morning Journal, 14th January, 1865.

The Florence correspondent of the *Morning Post*, writing on the 7th inst., reports the details of most remarkable photographic experiments on the eye of a murdered person. It appears that on 13th April, 2nd June, and 22nd August last year, three murders were committed in Florence, in almost precisely similar circumstances, the victims in each case being lodging-house keepers.

In each case the corpse was discovered lying on the floor, with the throat cut from ear to ear, a pool of blood below her head, but only there—no marks of blood in any other part of the room—and a pocket handkerchief, the property of some one unknown, close to her person. The trinkets and money which she was supposed to have about her had disappeared, as well as other articles in the house. As no cries had been heard by the neighbours, the conclusion come to by the Florence police was to the effect that the murder had been perpetrated, in all probability, by two assassins, who had obtained admittance into the house when the poor woman was alone, under the pretext of wishing to see and hire her rooms; that one of them had suddenly thrown a pocket-handkerchief over her mouth and brought her to the ground, and that, when thus held fast and her cries effectually stifled, his accomplice had cut her throat.

Such was the conclusion come to by the police, and, in particular, by its chief officer—the Commesso di Publica Vigilanza, Leopoldo Viti—who, amongst other steps taken by him in each case, applied to the higher administrative and legal authorities on whom he was dependent for permission to have the eyes of the murdered woman photographed—an application which, in the belief that the granting it could lead to no practical result, was twice refused. Suspicion meanwhile pointed to a young man, Benjamin de Cosimi, who on the occasion of the first murder suddenly disappeared from Florence, and was known to have reappeared at the time of the third murder. He was arrested, and in his possession were found articles belonging to the last murdered woman, Emilia Spagnoli, and a blood-stained knife, the blood freshly shed. He now awaits his trial. Meantime the application by the Chief of Police in the third case was granted, and the experiments, with the results, are thus reported by the correspondent :—

" Under the direction of Marabotti, the examining judge, or Giudice d'Istruzione, a series of photographic experiments have been carried on, not for the special purpose of furnishing additional criminal evidence for conviction (as the other evidence, with that view, is believed to be superabundant), but in order to establish a general principle, or law, of universal or very frequent application. Emilia Spagnoli was found lying on her left side, her large, glazed right eye being turned upwards. The eye was photographed immediately after her decease. The photograph then taken has been reproduced in a greatly magnified form, so greatly magnified as to allow the lineaments of a human face, two inches in length, to stand out distinctly from the same. When I mention that Alinari, the first photographer of Florence, and indeed possessing a European reputation, was the artist by whom the work was executed, I need say nothing more as a guarantee of the fidelity and care employed on the occasion. From the tracing of the dim and nebulous outline, as actually found on the eye, to the completed outline of the face executed from that tracing by an artist who had never seen Benjamino de Cosimi, or any portrait of the man, and, again, from that completed outline to the two photographs of himself found in his possession at the time of his arrest—the transition, whether viewed as an artistic study or as a great question of medical jurisprudence, opens up inquiries of unsurpassed interest and importance. I am not, indeed, prepared to affirm that the first tracing in the series, as shown to me yesterday by the courtesy of the Judge of Instruction, Signor Marabotti, at his official chambers, so completely resembles the photograph of the living man, that, were I placed in a jury box, my verdict would be determined by the belief in their identity, but of the following fact there cannot be the possibility of a doubt. Whatever there is of marked, prominent, individual in that first nebulous profile has an exactly corresponding feature in the likeness of the living prisoner. A peculiar dilatation of the nostril, a depression in the centre of the upper lip (Benjamin dei Cosimi has lost his two front teeth), an unusual elongation of the mouth, a square but double chin, a certain massiveness about the region of the cheek-bone, and the outline of a whisker, are common to both. I purposely confine myself, in the present letter, to a simple statement of facts—of the circumstances under which these murders were perpetrated, the consequent photographic experiments instituted, and the result obtained, of which I was myself yesterday an eye-witness. There are very distinguished anatomists

—persons, too, deeply versed in all the laws of optics—who affirm that the whole thing is a mere freak of nature, to which no importance whatever should be attached. . . . I am happy to add that Signor Marabotti, with whom, from his official position, the prosecution of these inquiries rests, has evidently brought to his task a spirit worthy, in all respects, of a countryman of Galileo. The photographs, with all the accompanying and illustrative details, have been transmitted not only to the Medical College of Florence, but also to the medical colleges of Naples and Milan; and, by the authority of the Prefect of Florence, Count Cantelli, a series of photographic experiments will be instituted on the eyes of the patients in the hospital immediately after their decease."

THEODORE II. AND THE NEW EMPIRE OF ABYSSINIA.

(Translated from the Revue des deux Mondes, Nov., 1864.)

IV.

(Continued from page 76.)

The favour enjoyed by these two Englishmen, doubtless appeared to Mr. Gobat, the Swiss missionary who became later, Bishop of Jerusalem, an excellent opportunity for resuming his designs on Abyssinia. A kind of seminary had been founded at Basle under his patronage, in an old monastery, called Saint Crischona. There were prepared for foreign missions, and principally for those of Africa, young Swiss and Swabian mechanics, who received a very short theological education. The principle of St. Crischona and of Protestant missions in general, may be summed up in the following: the best way to give a barbarous people a high idea of European Christianity is, first of all, to make it appreciate the benefits of our civilization, by making it a partaker of them. Hence, they commence, not with preachers, but with trade-instructors. The principle is in itself a good and practical one, but its application at St. Crischona was defective. As a rule, the world measures the zeal of all kinds of apostles by the sacrifices which they make for their faith, and mistrusts those who gain money while occupied with the souls of their fellows. The authorities of St. Crischona had decided that twelve stations, each of which was to bear the name of an apostle, should form a chain on the road from Jerusalem to Gondar. The plan of this *via sacra* was very fine, but expensive, and almost impracticable. Eleven stations out of the twelve were Mahommedan territory; and whoever has seen the East knows the impossibility of making a single real conversion in Mahommedan

Africa. To this objection, they replied that these first eleven stations had no proselytizing end in view, and were only intended as commercial stations for the supply of the Abyssinian mission. Let it be so; but was it the intention of the subscribers to the undertaking, that their contributions should be employed to maintain private speculations, foreign to their religious interests, since these supplies could be much more cheaply obtained by means of a confidential agent, sent four times a year to Khartown or Massaoua?

In 1856 these attempts at religious propagandism began to be put into practice. M. Martin Flad arrived in Abyssinia from Basle: he was followed by ten of his countrymen, who have remained with him to this day, and who were located, some at Djenda, others at Darna, in the province of Dembea, and most of them in the hill of Gafat, about an hour's walk from Devia Tabor. They were very well received by the Negus, who tried to pass over the recent expulsion of the Lazarists; but when they asked permission to preach their doctrines, Theodore the Second quickly gave them to understand that he would tolerate no discussion of religious tenets, and only allowed them to make vague discourses on general morality. By special favour, M. Flad and a few others were authorized by the Negus to attempt the conversion of the Falachas (Abyssinian Jews), whom he disliked, and of the Galla prisoners, whom the Ouollo war had dispersed over the country. Before this decision, there remained but one alternative: to follow the precept of St. Paul and carry the Gospel to some people more disposed to receive it; but this was not the calculation of the reverend missionary Gobat, and, under the convenient pretext that it would be better to wait for some gracious interposition, they remained. They were soon required to satisfy the strange whims of the Negus.

Having read in the Bible that David went to war in a chariot, Theodore commanded *his Europeans* to make him one, leaving the form of it at their discretion. Accordingly, they did not make him an antique car, after the model of the Etruscan paintings, but a kind of green wagon that the Abyssinians took for a mysterious engine of war. This machine was carried to the camp, for they had forgotten to make roads to wheel it on. It was unfit for service at the end of a few days, and the wreck of the imperial chariot now adorns the arsenal of Magdala. The Negus, not troubling himself much with the result of this first attempt, ordered the missionaries to make him a mortar and bombshells. They at first declared that they had never learned to make them. There was then a repetition, but less tragical, of the scene between the Dey of Algiers and the convicts, so humorously told by M. Raffenel, in his *Voyage au Sénégal.* The refractory missionaries were not decapitated, but simply placed under arrest, and their servants put in irons, so that, to save themselves from dying of hunger, they declared their readiness to attempt the work. Two of them had some mechanical knowledge. A Polish deserter, formerly an artilleryman, made a model for them; and the emperor came to Gafat in person to be present at the first trial which succeeded, that is to say, the shell went off and burst in the air. The Negus returned home very much agitated, without saying a word, and made a first distribution of favours to his apostolic-founders, with a liberality that attested the impression produced upon his mind.

Serious events soon came in the way to draw him off from these secondary objects of interest. The campaigns directed in 1855 by the Negus, first against the Ouollos, then against Tigre and Negousie the pretender to the empire, had excited attention in Soudan and even in Egypt. Said Pacha who was just then engaged in his triumphal progress through Soudan, appears for a moment to have entertained an inclination to invade Abyssinia, and measure his strength against the new emperor. Pretexts were not wanting. The Egyptians retained some sympathy for Oubie, a peaceful neighbour, who had been succeeded by a more restless and less manageable government. Moreover, Theodore had probably launched forth some of the bravadoes in which he impolitically indulges; and besides, there was a fear, justified by the event, of persecutions against the Abyssinian Mussulmans. Nevertheless, an Egyptian aggression under the then existing circumstances would have been accounted a gratuitous act of violence, and Europe could not have seen it with indifference. Accordingly, the Consuls General at Alexandria, decidedly put their veto upon it. The Pacha much annoyed, declared that Soudan had no value to him except as an open door to Abyssinia—and that since he was not permitted to enter by it he would disorganise Soudan. He kept his word. The capital founded by Mehamet Ali at the conference of the two Niles is no longer anything else than a nest of bankrupt slave merchants. Said was obliged to confine himself to sending as ambassador to the Negus the spiritual head of the Egyptian christians, *Abouna* David, in order to obtain some guarantees of peace on the frontier, and security for the Mussulmans of the interior.

David arrived at Devra-Tabor in December 1856. The first interview was by no means friendly. The Negus with that feverish distrust which is the most conspicuous trait in his character, could not conceive that a christian prelate could come to him under the patronage of a mussulman prince, and imagined that a Mahometan must be disguised as the Patriarch. He asked him dryly whether it was devotion to the Christian cause, or obedience to Said Pacha which had brought him to Abyssinia. The conduct of the *Abouna* justified the opinion of Theodore. David openly carried on even in Abyssinia the trade in Galla slaves. He did not at first comprehend the haughty and absolute spirit with which he had to deal, and thought he could treat Theodore as his predecessors had treated the indolent and weak kings of Gondar. He proceeded so far that the Negus, without saying a word, drew a pistol from his girdle and capped it, then aiming at the terrified patriarch said calmly: "My Father, bless me!" David fell on his knees, and, with trembling hand, gave the required benediction. Even this lesson did not cure him; another day he spoke of excommunication, a serious measure, for a revolution might be its result. The Negus then begged Salama, the head of his church, to remove the ban of excommunication, and he, perfectly understanding the imperative nature of this prayer, hastened to comply with it. Theodore had assigned to each of the prelates, not far from his pavilion, a *zeriba* or enclosure of thorns, where they were to a certain extent in confinement, although surrounded with attentions and obsequious respect. David, upon the threshold of his door, stretched forth a menacing arm towards the tent of the Negus, and pronounced the canonical excommunication, to which Salama, from the middle of his zeriba, replied by a *veto* not less legal. Thereupon, the patriarch turning towards his suffragan, proudly told him that he was his superior, and that what he had bound no man could unloose. "You are my superior at Alexandria" replied Salama; "but in Abyssinia you are nothing and I am everything!" "Rebellious priest" said David, "I excommunicate you with your master!" "And I excommunicate you also" said the *abouna*, "And my excommunication is alone valid." In short, for two hours, the dreaded formula flew from one *zeriba* to the other, to the great scandal of the soldiers, who did not know which of these two infallible arbiters of the faith to believe. The Negus was not sorry to give the soldiers this practical lesson in scepticism, and to ruin, in their minds, a power which he dreaded for the future. When he thought the scandalous scene had lasted long enough he put a stop to it. The Patriarch David returned to Cairo without having accomplished anything. By way of reprisal, he caused everything that the Abyssinians possessed in Jerusalem to be seized, that is to say, the monastery founded by the ancient Ethiopian kings for pilgrims of that nation going to the Holy Land. The monastery and all its appurtenances were sold to the Russian bishop of Jerusalem for 60,000 dollars, which found their way into the patriarch's coffers. The Abyssinian monks cried out against the spoliation, but the Pacha of Jerusalem, gained over, it is said, by a timely bakshish, put them in irons and consecrated the spoliation for which the Negus has never forgiven the Copts and their Mahommedan patrons.

During these fruitless negotiations with Egypt, the Tigreen revolt suddenly assumed the dignity of a diplomatic question and entered a new phase. From his retreat in Halai, Mgr. de Jacobis, had patiently waited for an occasion to strike a serious blow at the persecuting power, which it is well known, he never acknowledged. The revolt in Tigre appeared to him to be vigorously carried on, and he did not hesitate to enter into it, giving it a religious and political character not yet apparent. In order to feel his way he sent to Negousie an obscure agent to ask him, now that he possessed the whole of Oubie's former territory, for the religious liberty which Oubie had voluntarily granted to the Catholics. This overture, which had nothing compromising in it, was well received by the young pretender, who easily saw the advantage to be derived from it; he replied by the kindliest assurances, but entered into no more than the necessary engagements, and invited Mgr. de Jacobis to remain for some time still at Massaoua, under the pretext that to enter Abyssinia during the rainy season might endanger his health.

A little while after, M. Chamin-Belliard, the French consular agent at Massaoua, a man entirely devoted to the designs of Mgr. de Jacobis, came to visit Negourie at Diksan near the frontier, and made the first step towards engaging the French government in the affairs of Abyssinia. That government, confiding in the agreement of the reports addressed to it by its direct or indirect agents in the Red Sea, recognized Negousie, who hastened to send to Paris two native ambassadors, escorted by a Piedmontese Capuchin monk, the bearers of an act, ceding to France the islands of Desset and Ouda near Massaoua, as well as the port of Zoula, the ancient and celebrated Adulis of the Ptolemies. Mgr. de Jacobis pushed forward this matter with a zeal more ardent than his superiors approved of, they being desirous of avoiding reproach against the interference of missionaries in politics. The embassy was well received at Paris. The French government, only possessing information of doubtful accuracy, adopted a line of conduct which has since been unjustly criticised, and which, then, was the only one possible. It recognized Theodore the Second as king of Central Abyssinia and Negousie, as king of Tigre, and, while entering into relations with the latter remained upon amicable terms with the Negus, who thought fit, without acknowledging the change, not to break with France.

The success of Negousie in diplomacy had to be supported by vigorous military action. The provinces in the north of Mareb, were still in the power of Dedjaz Haïlo, a Theodorist general. This general imagined himself quite secure from an attack on the part of the pretender, separated from him by two provinces and the rude valley of Mareb; but he had counted without one of these strategic thunderbolts unknown in Abyssinia till the time of Theodore the Second, and which Negousie was happily able to imitate. The pretender passed in a single day (September 1858) from Diksan to the heart of Seraoue, by a fifteen hours' march across a wild and very broken country; he crushed Haïlo in a single contest near Sahzega, killed his son Tesfa-Zion and chased Haïlo himself into the *coinadega* (middle plateau) of the Bojos; then he subdued Seraoue, Hamazene, and Demblas, the northern provinces of Tigre, without striking a blow. The warlike inhabitants of the *Kolla* or lowlands of Konayn, tried to resist him; entrenched on a mountain, inaccessible in part, they defied the invader and beat their *nagarit* (war drum) till the moment when a body of picked men taking them in rear, surprised and made a fearful massacre of them.

These victories of the pretender did not take the Negus by surprise. His principal agent in Tyre wrote to him to make all possible haste, and gave him the news (absurd indeed, yet which filled all Abyssinia and even Soudan with the liveliest apprehension) that 12,000 French soldiers had landed at Massaoua. Theodore the Second was undoubtedly better informed by his agents at Massaoua, for, had he believed in the arrival of a single French battalion, he would have taken good care not to risk a battle; but he knew the true character of the relations of France with his rival, and, as if to bid defiance to Europe and civilization, he revoked his decree against slavery, thus renewing the plague spot which still dishonours the Abyssinian empire; then he marched, with all haste, into Tigre. Negousie wished to wait and give him battle; but, persuaded by the Tigreen generals, who, in spite of their indisputable valour, dreaded in Theodore the fortunate soldier who had declared himself the man of Providence, he left his camp at Haouzene, crossed the Mareb and took up a position at Addi-Mangonti, to the north of Seraoue, not so advantageous for defence as for flight in case of disaster. Theodore followed him at a distance, careful not to press him too closely, and proving, by this circumspection, quite foreign to his usual style, the high idea he possessed of his enemy's skill.

It was in these untoward circumstances (1859) that M. de Russel, a distinguished officer of the French navy, arrived at Massaoua, charged with the mission of entering into communication with Negousie and settling the acquisition of Desset. His mission produced a lively sensation, as is ever the case in the East in occurrences connected with the name of France. The report already circulated, that 12,000 Frenchmen had landed at Massaoua, raised the hope of the Tigreens to the highest pitch. An old tradition, very popular among them, asserts "that the Franks will one day conquer Ethiopia, that they will enter by Hamazene and camp in the plain of Ad Johannis." This legend had just been rescued from oblivion by a nun, who had come from Godjam into Hamazene, where she had made for herself a great reputation for sanctity, and who publicly announced "that the new master of Abyssinia was about to arrive by the Red Sea." Great was the disappointment, when the French envoy appeared, followed by only six sailors, at Halai where he stopped, and where, badly surrounded and informed, he lost long days in the formalities of etiquette, and gave time to the Theodorists to organize. The militia of the warlike province of Kollagonzay surrounded Halai but without proceeding to violence. Tumultuous scenes took place at Halai among the Tigreens, who thought themselves betrayed; the French flag was trampled under foot. M. de Russel and his men showed much resolution and presence of mind; but surrounded by enemies, they had to give way, and descending into the ravines of Taranta, by night, they regained Massaoua (February 1860.) Negousie, then, losing all hope of putting himself into communication with the French agent, made a disheartening retreat, which demoralized his troops more than a lost battle. Thirty leagues west of Adona, behind the level and open plateau of Tigre, begins a confused mass of low hills covered with virgin forests that man abandons to leopards, elephants and lions. This is the *mazaga*, a kind of African Sologne where deadly fevers reign, a vague frontier that the Barea negroes sometimes cross in order to surprise and plunder some Abyssinian village, but where the Abyssinians take good care not to follow them, although this country is nominally a dependency of the empire. It was towards these wretched valleys that Negousie fled, following the right bank of the little river Mareb, a rocky, wooded road, favourable to defensive warfare. His rival decided to cut off his retreat, left Axum and Tigre on his right and descended towards the Mareb by the plateau of Addi-Abo, an excellent position, at once commanding the Mareb and the Takazze; but when he arrived in the lowlands the enemy was gone and had already taken up a strong position in the heart of the Ethiopian Alps; the Negus, hesitating to risk a battle and expose his troops to death from the murderous miasma of these grounds, followed him at a distance for one day, and, at last, was obliged to retire.

Gloomy and threatening, the Negus returned to Gondar. He had just heard that Mr. Plonden, the English consul, had been murdered by the soldiers of an insurgent chief called Garet. Some arms, discovered in the houses of suspected parties, furnished him with a pretext for terrifying the city by bloody executions, then he marched upon the Waggara in pursuit of Garet, who, feeling the inferiority of his forces, descended to the little plateau of Tchober. There, seized with frenzy, Garet resolved to risk a kind of duel: having recognized, from a distance, the Negus who was approaching, followed by a group of officers, he galloped up to Theodore. Having come within close range of him, he rapidly presented his gun, aimed at the Negus and fired. Theodore avoided the shot and got off with a slight wound in the shoulder. At this moment, the *Likamankuas* Bell, seeing his master in danger, made some steps forward to cover him, took aim at Garet and brought him down, dead; but, almost immediately Bell fell, pierced with a lance thrust in his side. Garet's men, dismayed, laid down their arms and the Negus brought them prisoners to his camp at Dobank in the highlands. There, his repressed fury burst forth and displayed itself in a frightful massacre. The prisoners, to the number of 1700 were cut to pieces and their corpses left unburied on the plain of this name, which I found, nearly three years later, still covered with whitened skulls.

However, the period of a decisive struggle with the pretender Negousie was approaching, and Theodore prepared for it with a gloomy and silent activity that contrasted with the indecision and want of system exhibited in all Negousie's operations. The latter, since the departure of M. de Russel, felt that he was lost; he was heard to say: "I fall as much by the hand of my friends as by that of my enemies." The head quarters of the Tigreens, a kind of flying camp between Adona and Haouzene, had become a theatre of intrigues and clamorous rivalry; a certain number of French adventurers had come thither, attracted by the reports noised in Europe, in connection with the name of Negousie. Commerce was dead and the peasants no longer dared to frequent the markets, periodically plundered by Negousie's bands. Nevertheless, the whole of 1860 passed over without any serious hostilities. The Negus still seemed doubtful of success and wished to treat with his two most formidable enemies, Negousie the pretender of Tigre and Tedla-Gualu, the chief of the Godjam insurrection. He proposed to leave them the two provinces they occupied, in fief, on condition that they should recognize him and pay tribute. What he held most to heart, in fact, was the recognition of his royal title: Negousie, almost independent viceroy of Tigre, but renouncing the title of Negus of Ethiopia, had never been more in condition to give umbrage to him than any other great vassal, entrenched on his impregnable mountain. Negousie replied that he had granted, by oath, several fiefs to chiefs whom he named, and that honour forbade him not keeping his word; Tedla replied in the same manner, adding derision to the refusal.

In January 1861, Theodore the Second put himself *en route* and marched towards the mountains of Temben, where Negousie was encamped. The intrigues of the Negus, mingled with promises and threatenings, had already dissolved his unfortunate army. On the night which followed the arrival of the emperor at the Tigreen camp, the besieged heard with terror a herald posted on a neighbouring hill, invisible in the mist, making the following proclamation: "These are the words of *djan-hoï*. I pardon all who quit to-night the camp of Negousie, and assign them three *ghedem* (asylums), namely: the church of Axum, that of Adona and my own camp. As for those whom I shall find under arms to-morrow, let them expect no mercy!" In the morning Negousie had around him only his faithful Agaus and a small number of Tigreens; most of his soldiers had dispersed to their villages, the chiefs who were most compromised, having retired to the two churches of Axum and Adona. The unfortunate man, shedding tears of rage, assembled his last defenders, cut his way through the army of the enemy and threw himself into the mountains with twenty horsemen. Vigorously pursued, and daily losing some of his men by death or flight, he ended by falling in with some peasants, who recognized him by a broken tooth and brought him to Theodore, along with his brother Tesama. The pretender, it is said, exhibited little dignity before the conqueror. Theodore, for his part, seemed disposed to clemency: he told the two brothers that he would leave them their fiefs if they would pay tribute and caused supper to be prepared for them. The two captives passed the night full of hope; but the next day, the wind had changed: the Negus ordered the right hand and left foot of each to be cut off, and, by a refinement of barbarity, forbade that water should be given them to quench the burning thirst which always follows this frightful operation. Tesama died under it the next day; the strong constitution of Negousie kept him up for a longer period, and, it is thought, that, had the Negus allowed him the attentions rarely refused to those punished in this manner, he would have been cured. On the third day, he begged, himself, for the lance thrust which put an end to his intolerable tortures.

Thus perished the only man who has seriously endangered the political edifice inaugurated by Theodore the Second. His death—closely followed by that of his principal generals, who were executed at Axum, in spite of the inviolability of asylum, and of the promise given—was imputed to the negligence of France and has served as a ground for many accusations against her: it has been already seen whether they are well founded or no. As for the conqueror, the infatuation that has come over him shows the degree of uneasiness that French intervention inspired him with. When he entered Axum, after the execution of the vanquished, and received the trembling deputation of Axumite clergy, he pronounced an oration, of which the following words are remarkable as the most foolish perhaps that man ever dared to utter: "I have made an agreement with God. He has promised not to descend to earth to injure me and I have promised not to ascend heaven to fight with Him."

THE POLICY OF THE NEGUS SINCE 1861.—HIS RELATIONS WITH EUROPE.

I.

In the spring of 1861, the Negus, Theodore the Second, the subduer of a rising which had nothing less for its aim than the dismemberment of his empire,* had arrived at the summit of his physical and moral power. External difficulties no longer existed; resistance from within had altogether vanished before the prestige of a victory, so much the more brilliant on account of its having been so long disputed. None of the great native class felt themselves strong enough to raise the standard of Negousie; but the friends of the unfortunate pretender remained, who, at the extremities of Abyssinia, sought to pass unnoticed; there were Tedla-Gualu in Godjam, and *Dedjaz* Merid in Hamozene, who had valiantly defended this province against the great imperial officers of the frontier. Mered succeeded so well in hiding himself, that from August, 1861, he appears not to have been implicated in any of the political events of the empire so that finally the Negus generously pardoned him. As for Tedla-Gualu, his resistance was to be more serious, but it had not yet exhibited itself at the period of which we are now writing.

---

* See article in last number.

Borne along by an irresistible current of public opinion, saluted as the representative of the empire's order and unity, Theodore the Second was in one of the most favourable positions for applying to his people ideas borrowed from Europe with much prudence and discernment. The small class among us, interested in Abyssinian affairs, expected in some degree to see an African Peter the Great rise in Gondar. Did he seriously dream of playing such a part? Recalling the earlier stages of his history, we may doubt it. The Negus wrongly persuaded himself that Abyssinia was rich enough in historical wealth to draw from the past the element of its future progress. This system, extremely flattering to Abyssinian patriotism, could only be withstood by the influence of an intelligent European adviser, devoted and courageous enough to tell the Negus the truth to his face, and sufficiently loved by him to make him accept it. Radama the 1st of Madagascar had found such a man in a common sailor of Brittany, Coroller, whom he made prince of Tamatare, and to whom he owed much of his greatness. The death of Mr. Bell had unfortunately removed the only man who could have rendered a similar service to Theodore. The policy of the Negus, thus left to himself, rested upon this basis, that the revival of the Abyssinian empire required the reclaiming of its frontiers,—a project almost as Utopian as it would be for Turkey to seek the restoration of her limits as they were at the end of the sixteenth century. This programme would necessarily arm him against a well organized government, that of Egypt, and against an ill organized, but obstinate and warlike people, the Gallas. The last years of Theodore's reign, which I am about to describe from my recollections, will in fact exhibit him directing his restless activity now against Egypt, and now against the Gallas, when not engaged in warfare with the chiefs of countries bordering on the Empire, such as Gadjam, whither Tadla-Gualu had betaken himself.

The causes of rupture with Egypt were numerous, and especially depended on geographical circumstances. Nature has clearly traced the boundaries of the two states; but at the foot of the last step leading to the Abyssinian plateau, in the latitude of Khartoun and Massaoua, live five or six tribes of shepherds who emigrated from Abyssinia, two or three centuries ago, probably on account of an excessive increase in its population, and who nominally recognise the sovereignty of the Ethiopian Empire, *nanghesta Aithiopiya.* The Turks, who conquered

Nubia in 1820, have profited by the isolated position of these tribes, nearer the Egyptian garrisons than to Gondar, to bring them under their yoke. Said Pacha, in 1856, promulgated in their favour a series of rude and protective regulations which the rapacity of the Egyptian agent made a dead letter of, and the people, whom the enlightened and truly civilized administration of Arakel-Nubar (1) and of his successor Hanan-Bey had given cause to hope for better days, fell into the hands of venal satraps, and saw their imports and levies yearly increasing. Thenceforward there sprung up a daily increasing sympathy for the government of Theodore the Second; but the Abyssinian governors of the frontier, in place of encouraging, with a view to the future, these amicable feelings, protested fruitlessly enough against the Mussulman conquest by inflicting upon the unfortunate inhabitants of a country as large as Portugal frequent sudden and murderous raids. To add to the difficulty, in the midst of these colonies, and about seven stages from Gondar, there is established a camp of Egyptian refugees commanded by a man well known in Eastern Africa, Oued-Nimr, the son of the panther-king whose dramatic history we narrated three years ago. The faithful inheritor of his father's hate, Oued-Nimr has drawn around him in his town of Mai-Gowa, the many Bedorims who find the Egyptian yoke too heavy to bear : he makes incessant raids against the Arab tribes in subjection to the viceroy, and when he finds himself too closely hemmed in, he ascends the Abyssinian plateau where the Negus has given him the important fief of Kablita (Cafta.) In May 1850, upon my arrival in Africa, Oued-Nimr, calling himself a general in the service of the Negus, had made a brilliant stroke against the tribe of the Choubrie, the most powerful of the Arab tribes of the Nile, and in the name of Theodore the Second had demanded tribute from all Upper Nubia. The governor of Khartown had replied to this bravado by a bold dash upon Mai-Gowa, which had been burned, and Oued-Nimr, defeated in an unimportant skirmish, put off his vengeance to a more favourable opportunity. In fine, the attitude of the two states, Egypt and Abyssinia was in 1861 that of two neighbours very aggravated against one another, but hesitating to open serious hostilities, and fighting only with harmless proclamations.

The great care of the Negus was to settle with the Gallas. I have spoken elsewhere of this mysterious people, who closely resemble the Abyssinian in the features of the face and in their moral character, and whom the latest travellers have found living even at the equator, on the banks of the great lakes of the Nile. Having left three centuries ago the plains through which the Nebi flows (an immense river half fabulous and still waiting for its discoverer), they invaded like a rising tide the too vast and decaying empire of the Negus, and reduced to fourteen the forty-two kingdoms which rendered the monarchy so proud. They founded, in their turn, numerous states, monarchies as Gonderon, republics as Djimma, but they were feeble through their isolation and the want of every federative bond. In the midst of this barbarous invasion five or six Abyssinian kingdoms have survived, for whom a confused tradition preserves the name of Christians, but whom their separation from the great Abyssinian trunk has thrown back into barbarism; among others are Gindjero, Gouraque, and Kaffa, which has given its name to the precious bean which Europe continues to buy from it, under the name of Mocha coffee. The Negus who had never resigned his claim to any of the ancient dismembered parts of the Abyssinian empire, had boldly announced his intention, as soon as the civil disturbances were settled, of reconquering all those kingdoms almost nominal, Gindjero, Bahagamo and many others, whose names vary in our maps at the will of a thousand suppositions, and of making Kaffa and Enarea tributary to him.

---

(1) Brother of that Nubar-Pacha whom the Isthmus of Suez question recently brought to Paris. Arakel-Nubar died six years ago while governor of Khartown.

Meanwhile he confined his attention to that portion of the Galla race, which inserted like a wedge into the very heart of Abyssinia, formed a permanent obstacle to territorial unity; these were the Ouollos, who had been so rudely tried six years before. After the death of Adara Billé, they had been organized under the command of a former page of the Negus, young prince Bechio, whose patriotism had overcome his feelings of gratitude. Bechio had availed himself of the troubles of Tigre to ravage, without mercy, the christian provinces.

Theodore, leaving Negousie, marched rapidly in 1861 to the river Bachilo, gained some success, but suffered much from a petty warfare in which the enemy, thanks to his excellent cavalry and to a ground unfavourable to the invader, had the final blow. The Negus was obliged to retire to Debra-Labor. His enormous army, dying with hunger and fatigue, strewed the road with the sick and wounded. The Ouollos shewed to these unhappy men generosity which naturally astonished them; they collected, tended and fed the implacable enemies who had just burned their villages and carried off the children. The Negus, having but little gratitude for such a noble action on the part of the "barbarians,' recruited his army quickly at Bachilo, entered again in 1862 the territory of the Ouollos, destroyed them by a war of extermination, and advanced as far as Mount-Rollo, dragging after him poor prisoners whose hands and feet he caused to be cut off in cold blood. The greater part died from the effects of this horrible mutilation. "This act was done very speedily," said a native priest to me: each soldier seized a man and butchered him as he would a sheep. Nothing so atrocious had ever been witnessed before in Abyssinia.

When Theodore II. repassed Bachilo, he left behind him nothing but a bloody desert, covered with ruins, and traversed by some large bands, the remains of a great people who had formerly played their part in the great drama of the world's history. Vengeance was satisfied. The women and children had been divided among the soldiers, who sold them to the Mussulmans; therefore, in the month of May of this year, Metamna, the great market of slaves on the Egyptian frontier, was abundantly supplied. The men were carried far into the interior of the Empire and employed in the construction of roads. These roads are almost the only substantial benefit which the Negus has conferred upon Abyssinia. Already before this he had caused to be built a portion of a road near Drea-Tabor by way of trial, and had employed soldiers upon it. On one occasion they murmured and Theodore seeing this threw off the embroidered gown which he used as a cloak, quickly seized a heavy stone and carried it to the side of the road. "Now," said he, "let him who is too noble to do as I, tell me so." There is no necessity of saying whether his example was followed. Afterwards, when the

Negus had employed the Gallas on these works, he formed a network of well made strategic roads, especially between Derra-Lahor and the river Abaï. I can bear witness in his praise that these Gallas, whose work-yards I have sometimes visited, were well fed, regularly paid, saved money, and on the whole appeared happy.

The remainder of the year 1863 was devoted to fruitless operations at Godjam, against the obstinate Tedla-Gualu, who, rendered strong by the sympathies of the province, lived without anxiety upon the *amba* of Djibela, the ancient fortress of Beurron Gocho or sugar-loaf, which, almost impregnable by nature, he had also fortified. Djibela, surrounded by abysses, communicated with the neighbouring plateau only by a very low path, in which only two men could walk abreast, and above it were suspended three or four enormous rocks secured by strong chains. Tedla had facetiously given them names from the calendar of the Saints. "If ever the Ruaranga, said he, leads his troops into this path, I will not fire a shot at him: it will be sufficient to let loose Saint Michael in order to sweep everything within 500 feet into the precipice." This country, offering no great attractions in a military point of view, coincided, however, for the Negus with circumstances which were destined to have a great influence over his future.

I enter here upon a series of events much more delicate to relate as I have been led to play a part in them which has not always been voluntary. The reader will understand without difficulty the repugnance which I feel in dwelling upon these remembrances, and the feelings of propriety which oblige me merely to mention facts rather than explain them. Summoned in 1862 to represent the French government at Gondar and to carry out in Abyssinian affairs a policy full of sympathy for the Negus, I arrived eight months afterwards at the court of Theodore, who gave me a brilliant reception and did not conceal the joy which he derived from this official proof of the good intentions of France. He had just received a no less flattering proof of those of England. The foreign office, after much hesitation, had resolved on appointing a successor to the skilful and unfortunate Plonden. It had chosen, from many worthy applicants, an officer of the Indian army, captain Duncan Cameron, who had become familiar with the East through his residence at the consular post of Poti on the Black Sea, and who was full of good will for the Negus and the new empire of Abyssinia. Theodore had received him well, had assured him of his esteem for England, for France and their sovereigns; then he had spoken of the Emperor Napoleon III. as being wrongly prejudiced against him, and of his desire of forming closer relations with the French government. Learning that Mr. Cameron had a French traveller for a Secretary, he intrusted to him a very courteous and suitable letter for the Emperor, and sent him away as soon as possible. Theodore II. has been accused of thoughtlessness in confiding such a message to an unknown tourist; but the Negus, after the provocations and the insults with which he had harassed Egypt, feared that if Abyssinian envoys should enter the Egyptian territory, they would be ill-treated by the impure hands of the infidels, and he knew that on the other hand the European had nothing to fear. It was about this time that I arrived at the court of the Negus, who received me, as I have said, very friendly, and desired me to accompany him in a new campaign which he was about to begin against Tedla-Gualu. Desirous of not losing such an opportunity of maintaining the good feelings of the Negus in the interest of the mission with which I was charged, I did not hesitate a moment to follow him. I think it proper to employ here some leaves from my journal, to lose none of the remarkable incidents from the commencement of this journey.

"Feb. 11th 1863." The order for departure was given this morning at 9 o'clock. A tumultuous mass of infantry formed the advance as if to reconnoitre the road; after them followed, richly equipped, the little group called the staff, of which I form a part with the five or six invited Europeans, and in front of us was the Negus, accompanied only by a page who carries his shield. Behind us is a long column of cavalry, while our servants move amongst them, not without danger, and hold our spare horses by the bridle.

We pursued for two hours and a half a very good road through a country open, charming, filled with villages and with cultivated fields, which recalls to my mind, in some degree, the Norman Bocage, between Vinie and Damport. To complete the resemblance, the land, by being intersected by numerous hedges and fences, informs us of a property very much divided, and this, however, is the general law in Abyssinia. This province is called Aferadanet. For nearly eleven hours we descended a somewhat steep declivity, and we saw through the trees a magnificent plain, unfolding itself to our view, covered with rich meadows, furrowed by a ravine in which roars a furious torrent, and called the Abai or the White Nile. This torrent, which, from the height where I am situated, appears only a thread of foam, corresponds so little with all that I have read about the Abyssinian Nile, that I only allowed myself to be convinced of its truth when I arrived at the Portuguese bridge, where we halted at noon.

"This bold construction, due to Portuguese engineers in the service of the Negus, resembles, in some respects, the magnificent bridges of the Romans: for instance that of El-Rantara over the Rummel, near Constantinople. It is said that the Portuguese have again found the secret of the Roman cement, vainly sought in our time; entire pieces of the parapet have fallen along the piers without the furious waters succeeding in separating the stone. Two little forts, guarded by select fusileers, command this important passage. The Negus has taken his place at a window of the lower fort, and we, in groups a little below him, witness the defiling of the troops. This is truly a very fine sight. What is wanting in order and discipline is compensated by the picturesque appearance, and still more by a military ardour which would delight a European officer. Cavalry, infantry, baggage, servants, in fact everything descends, or rather rolls, along in a thick cloud of dust through which thousands of lances flash. They defile over the bridges, generally four and four, always on the run. Etiquette obliges all the officers to walk while passing before the window where the Emperor reclines, so that we lose sight of the superior officers, the vassals of the Empire, who are surrounded also by their vassals. I was shown *ras* Enghedda, the dethroned prince of Godjam, who has remained some years in chains, but was recently set free, and now is very jealous against his ancient subjects. He is a very fine looking man, imposing, and has an appearance somewhat dejected, fierce and startling, which renders him interesting. I distinguish easily, in the crowd, from twenty to thirty fusileers, clothed in the Arab fashion, perfectly disciplined, and commanded by a large fine young man, with a red caftan and a muslin turban. This sort of Malek-Adhel is nothing less than Naib Mohammed, prince of Arkiko and nominal sovereign of Maparua; although a Mussulman and a vassal of the Pasto, he holds in fief 16 villages of Abyssinia on the side of Halaï. The prince of Arkiko has come to the camp, it is said, to solicit the confirmation of this infeudation, which is very ancient, as it is mentioned by Bruce.

"The defiling lasts four hours, 4,000 men at least had passed. I experience a certain satisfaction in seeing this mass of men, in its apparent confusion, obeying evidently an active and powerful direction. It is indeed the army of order, hastening on to put an end to the last attempts of a selfish and incorrigible feudality. Such, at least, is the general impression. About 4 o'clock, the Negus gives the signal for departure by crossing the bridge: I follow him on foot as he and we climb quickly the steep side of the right bank, to avoid the crowd which encumbers the road called the imperial (*Negus Mangad.*) It is one of the pranks of this untiring walker to impose those severe walks upon those whom he admits to his rude friendship. We encamp a league further on, in a charming prairie, on the brink of a limpid river which is called, I know not why, the Black Water (*Tokom Ohha.*) My tent was scarcely pitched when I saw a column of 200 or 300 men coming towards the quarters of the Negus and uttering great cries of joy. I approach and I see a huge lion, pierced twice by a lance in the side, and borne upon a litter; the vanqisher arrives in triumph upon the shoulders of his comrades, while his right side is bleeding from four wounds caused by a blow ot the lions paw. He is a little soldier of no great appearance. The Negus gives him 30 talaris, a fortune for a poor foot-soldier.

"Feb. 12. We began this morning to leave the low grounds (*Rolla*) and to climb the plateau of Aghitta, upon which we encamped about 10 o'clock. I embrace at one glance a thrilling panorama. At my feet, and at an imposing depth, a network of verdant and woody valleys is visible where the silver thread of the Trul winds along; a curtain of intricate woods robs me of the sight of the dark channel in which the Blue Nile rolls and roars, where bounds the cataract of Alata, so well described by Bruce. To the S.E. rises an isolated peak, which has a romantic and sinister name, Asnola-Negus (the King of the Vampires). It is there, the Abyssinians say, that the crowd of the *bonda*, half-vampires, half-ulchewolves assemble, the heroes of a thousand tales which recall entirely the legends of Hungary.

Feb. 16. We are encamped on the top of the sierra of Arnid-Burnid while an intense cold prevails. From this height I can see 5 hours march towards the west, enveloped by the mist, the hills of Sakala, from the middle of which flows the triple source of the sacred river. This source was discovered within the last three centuries by P. Paez and fellow travellers, and was seen again by Bruce in 1772. I would willingly add my name to these great ones; but the district of Lakala is in the power of the rebels, and the smiling valley of the Gumara, which we entered some hours afterwards has not consoled me for this disappointment."

I follow no further my personal memories, noted day by day, and I resume the record of military transactions. Everything promised success as far as the mountains of Lagado, where we entered the enemies country. The rebels appeared terrified and incapable of fighting; but the invaded country passively resisted, trying to remain neutral in the contest, and refusing tribute and subsidies to belligerent powers. Theodore, who had neglected the commissariat was obliged to confess his error when there was no longer forage for his horses. He became furious, ordered the whole country to be pillaged and the villages to be burned. Two hours afterwards, 22 villages were in flames in the mountains of Lagado and Abizan. A peasant was led to the Negus who, posted at the door of a church where the people of the district had concealed their valuables, had defended the sacred place with arms in his hands and had wounded a plunderer. He stated that he had been charged by the Negus himself with the guarding of the church. "Who is this wretch," said Theodore, "who uses my name to tell a falsehood?" And he ordered his hand to be cut off. Such severe acts exasperated the inhabitants and did not assist the expedition. A numerous force, rushing forward to plunder the rich country of Araga, and scattering in order to rob, was surprised by the insurgent cavalry, vigorously pursued and lost several hundred men. After six days hesitation, the Negus ordered a retreat. The discontent of the army was shewn by numerous desertions. Theodore beat the country with masses of cavalry who slew without mercy all the soldiers who were caught in the flagrant crime of flight.

From this difficult situation a plot arose, the most formidable which had yet threatened the power and the life of Theodore. Several noblemen of distinction resolved to surprise the Negus while on one of those wild expeditions which he sometimes made, especially at night, and put him to death. The chief of the conspirators was the Governor of the province of Alga, and he, unfortunately for himself, had confided the secret to his wife. When he was mounting to rejoin the imperial camp, his wife came and desired him to purchase for her a valuable robe which she desired. Her husband refused, and his wife told him very coolly: "You shall suffer for this!" This circumstance caused him no uneasiness. She kept, however, her word, for some days afterwards she came to the Negus and revealed to him all the details of the conspiracy. Theodore, more surprised than alarmed, looked her in the eyes and said: "Nothing is ever done without some motive. What is it that has urged you to disclose that which dooms your husband and your son to death?" "I thought," said she, "that some one of the conspirators would discover the plot to you and that then mine would be irrevocably lost. In disclosing it to you, I obtain the right of begging the life of one of them, of my son, whom I love." Theodore dismissed her without making any promise. On the first of March, 1863, at 5 o'clock in the evening, in the midst of a battalion drawn up in square, 18 conspirators were brought before the Negus and had their hands and feet cut off; then a prohibition was made that they should not receive any care, and they all died after sufferings more or less prolonged. The son of the prefect of Alaza was spared no more than the others.

This abortive plot darkened the soul of Theodore, and had doubtless some influence upon the events of the next day the 2nd of March. That day, on absurd suspicions which I have never been able to explain, I was arrested by the command of the Negus and put in irons, as well as the Naïb of Arkiko. He remained in chains a month and received for reward a rich fief upon the frontier. I was released after a few hours on condition of remaining prisoner on parole. Devra-Tabor was assigned to me for my residence, with the permission to go wherever I pleased within a circle of 30 to 40 leagues. Nothing now remained for me to do except to remain as a spectator necessarily inactive in the midst of the great events which the new attitude of Egypt towards Abyssinia seemed to announce.

Egypt in fact, excited by the verbal or written provocations which had been directed over its provinces by the Abyssinian governors of Walkai and of Addi-Sobbo had re-established the organisation of Soudan upon the same basis as before 1856, and had sent to Khartown with almost unlimited powers, a governor general named Monca-Pacha, an energetic soldier, but a despotic and a venal administrator. This man, who had formerly been a Circassian slave, boasted that he had emasculated or decapitated 14,000 men while he commanded the army of occupation in Nubia. He was, in the opinion of the viceroy Laid-Pacha, the only chief capable of contending with energy against Theodore. Having arrived at Khartown in the summer of 1862, with 4,000 regular troops and rifled cannon, he had passed the winter in disciplining his troops, and in Jaauary 1863 he had slowly marched towards Gallabat, where he arrived on the 19th of February at the head of 10,000 to 12,000 men. He had pretended to threaten Abyssinia, but he had confined himself to the oppression of the province, which this occupation of nine days completely exhausted. Theodore, lying almost 80 leagues from there, near lake Tana, did not stir, under pretext of eating fresh fish "as it was the season of Lent." To tell the truth, the two generals, although both brave, did not dare to risk a battle. The Negus had kept in remembrance the artillery of Salah-Bey, and the soldiers of Monca, not knowing that the horrible custom of mutilating prisoners had been abolished by Theodore, had a terrible fear of falling alive into the hands of the Abyssinians. The Negus understood without difficulty that the Egyptians would not attack him, and, assured of this fact, he directed all his attention to the insurrections which were multiplying in the interior. One Terso had revolted in the mountainous districts bathed by the Zarima; a very near relation of the Negus occupied Kouara, and had put in irons the governor appointed by the emperor; in another part of the same province, a *Nygade* or a mere merchant, called Rassa, had his head turned by priests who had related to him pretended revelations from heaven, and had convinced him that the reign of the emperor was at an end, that his was about to begin. Although he paid little money and was not a soldier, he had collected, it was said, 4000 men. In Choa, in Tigre, two or three more obscure rebels were in motion. This material anarchy was the result of the moral anarchy in which Abyssinia had languished so long; the Negus had bravely struggled against it at the beginning of his reign, but he was growing weary. Only one gloomy thought absorbed his mind: "God," said he, "who has raised me from the dust to supplant legitimate princes, has not performed this miracle without an object. I have a mission—but what is it? I believe at first that it was to exalt this people by prosperity and peace, but in spite of all the good I have done I see more rebels springing up than in the time of the worst tyranny. It is evident that I am deceived. This nation is stubborn and needs to be chastised before it is called to enjoy the blessings of Providence. I see now my true part, I will be scourge, the judgment of God upon Abyssinia. As a sign of the new programme of his reign he had engraved upon the carriages of his howitzers: "Theodore, the scourge of the perverse." This strange idea destroyed the last scruples which retained him on a fatal descent. During the retreat from Godjam the army was subject to a threatening fermentation; the secret agents of the Gualu entered its ranks, spoke to these men, overpowered by privations, of the abundance which reigned at Djibela, of the rich cantonments of Godjam and of Damot. Desertions also increased in spite of punishments without number, and the discipline became worse every day. To keep them, the Negus determined, under various pretexts, to give up the finest provinces of the empire to all the excesses which an unbridled soldiery can commit. Sometimes it was not a raid upon horses, mules, and stamped money, but usually a general and laconic order was given: "*eat* everything." For three months, from March to June 1863, fourteen provinces of an extent equal to that of Switzerland, were thus *eaten* one after the other. The excuse which he gave for Dembla the jewel of the Abyssinian crown, was that the inhabitants had allowed a mussulman chief to escape who had been sent among them. It is related that when the plunderers returned to the camp, the king, who was seated upon an eminence, recognized among the booty the favourite mule of the *abonna* Salama, who was living then upon his lands in Dembla, and exclaimed: "Ah! the robbers have pillaged without my order my fine province of Dembla!" while he shed some tears which deceived nobody.

Beghemda was in its turn sacked under the pretext that some insurgents of Godjam, flying and disarmed, had found refuge in some village or other. It was seed time, about the first of June, and the country ran the risk of being six months later exposed to dreadful famine. The suffering of the people only slightly affected Theodore II., and yet he was thus killing the hen that laid the golden eggs, the country which had supported him and his troops during the most powerful of the former rebellions. On the first Monday in June, the market day of Devra-Tabor, a proclamation was issued. I have furnished, said the Negus to the peasants, those who concealed my enemies, and unhappily my orders were exceeded; but I desire the happiness of my people, and I have commanded that these things should not be renewed. Consequently I invite the peasant to return to his plough, the merchant to his business, and all to return in peace to their various occupations." This proclamation was welcomed with transports of joy; but it was soon seen that it was only an odious falsehood. Two days afterwards, the news spread that the savage bands of *ras* Enghedda had rushed like a torrent over Togara, Oauzaghié, charming countries, whose name recalls to the traveller only pleasing impressions. This report was only too well founded. The pillage extended to Terka; the venerated sanctuary of Baatha was not respected.

The Negus, from his camps of Boxarghef and Isti, where dysentery and hardships decimated his troops, continually directed rapid raids against the hostile provinces. He went out generally at night, with 500 or 600 horsemen, after having openly announced a raid which was never that which he really made; he would march all night and in the morning would fall upon the enemy surprised and unprepared for resistance. Thus he invaded about the end of July the province of Aganmida, where he surrounded some thousands who had deserted from his army and had fled to the people of Tedla-Gualu. He had no mercy, put them all to the sword, beat one of the best generals of the enemy who had left his service for that of the rebels, and published everywhere an official bulletin which raised the number of men killed in this engagement to 15,000.

I am convinced that he at least quadrupled the number since, on his entry into Agaumider, he had only 400 men, to which he added on his route some faithful contingents. After having ravaged this province and Alaza he returned to Genda; where he rejoined the English Consul, Mr. Cameron, on his return to Abyssinia after four months absence. The religious disturber of Konara, the veggade Kassa had taken refuge, on the approach of the Negus, in the *Kolla* or low grounds of the province. The country, terrified by the devastation of the neighbouring districts, was little disposed to assist him, and when Theodore ordered the inhabitants of Konar to destroy the rebel under pain of being treated like those of Alaza, the Kuaranya rushed to arms, defeated Kassa with ease, took him prisoner, and carried him to Djenda (August 19th.) The Negus had been greatly irritated by this revolt in the bosom of the only province in which he placed any confidence. "You have pretended that my reign is over," said he to Kassa, "but if such were the case have I not a son to succeed me, and by what means has he forfeited his claim?" It was evident to any one acquainted with the Negus that he would be implacable towards the audacious person who had doubted the stability of his dynasty. Kassa was summarily condemned and tied to a tree. Theodore sat coolly opposite him, had his gun given to him, took aim, and pronouncing the words of the sacrament: "In the name of the very Holy Trinity!" he sent two balls into his breast. The soldiers who were present pierced the corpse with their lances, and reduced it to a sad and formless mass. An event, which had been foreseen, happily gave a diversion to these bloody scenes. The ambassador of the Negus to Paris returned to Gondar in the beginning of September, bearing an answer from the French Government to the letter of Theodore II. He, proud of this diplomatic success, convoked at Gondar all the Europeans settled in Abyssinia to assist in the reading of the imperial message; but he previously opened the letter to deliver it to the interpreters, so that its contents were quickly known, and I was permitted, in advance, to act in concert with my British colleague, and the most influential members of the little colony, with a view to a common action upon the mind of the Negus in the sense of the instructions which I had received. The official letter demanded, in courteous but firm terms, religious toleration for the Roman Catholic missions, protected by Franco. I should render this justice to the missionaries of Basle in saying that they, directed by the English consul, and by M. Martin Flad, their principal leader, showed a great desire to offer me their assistance in this religious question with a view to toleration, conformable, as they justly said, to the spirit of enlightened Protestantism.

All this diplomacy was exerted in vain. The Emperor had been much irritated by the reception of the letter relating to the Roman missions. "I know," he had said the mode of European governments when they wish to seize a country in the East. At first missionaries are sent, then consuls to support missionaries, then battalions to assist the consuls. I am not a rajah of Hindostan to be laughed at in this way. I prefer dealing with battalions at once." After a series of curious and characteristic scenes, Theodore answered what he regarded as a provocation on the part of France by an order for the expulsion of the agent (28th September, 1863). I hastened to reach Massaoua before the news of my disgrace, spread over the route, might expose me to annoyances from the local authorities. I was henceforth reduced to the part of a disinterested, but not indifferent, witness of the events which were passing in this country, from which a personal misfortune had not withdrawn my sympathies. Not having formed any hopes, I had none to lose.

I had become very intimate with my English colleague, Captain Cameron. As we were breakfasting on the day that the decree for my expulsion was issued, Mr. Cameron said to me smiling; "Well! colleague, are the irons of the Negus heavy?" "Would you like to try them!" I answered in the same tone. "Ah! who knows?" Alas! the brave officer did not think he was speaking so truly.

II.

My expulsion left the field open to a new favorite of Theodore. He was the French agent of Negus of whom I made mention before, a young man, active, very intelligent and attentive, but destitute of tact and prudence. His self-possession, and a respectful familiarity, which is not the most unskilful flatery, had captivated the Negus, who, as a soldier, liked these bold qualities very much, (soldier-like, as the English say). Theodore found in him something more attractive; he was tired of the low and timid obsequiousness of the missionaries of Basle, who, after having formed canons for him, made brandy for him; and whilst he called them officially his children, he gave them the name of hypocrites in his humorous moments.

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST.—DECEMBER, 1864.

Latitude—43 deg. 39.4 min. North. Longitude—5 h. 17 min. 33 sec. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resultant Direction.	Velocity of Wind.					Rain in Inches.	Snow in Inches.
	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M	2 P.M.	10 PM	ME'N		6 A.M	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A.M.	2 P.M.	10 P.M.		6 A.M	2 P.M	10 PM	Re-sul't.	ME'N		
1	29.787	29.843	29.850	29.8292	36.7°	43.9°	38.1°	38.92°	+ 8.13°	.180	.199	.179	.185	.82	.69	.77	.78	W b S	W b N	W b N	N 64° W	6.0	3.0	2.0	1.99	4.29	...	...
2	.805	.612	.373	.5713	36.0	37.0	40.7	38.03	+ 7.55	.180	.201	.250	.212	.85	.91	.98	.92	E N E	E b N	E	N 78 E	11.6	18.5	12.0	12.55	13.04	1.130	...
3	.179	.133	.282	.2052	42.1	46.8	38.8	41.48	+11.40	.259	.207	.170	.205	.96	.64	.71	.78	E	W b N	W S W	S 77 W	3.0	28.4	19.5	13.08	14.85	0.250	...
4	.370	.448	—	—	33.8	34.2	—	—	—	.123	.125	—	—	.63	.63	—	—	S W b W	W b S	W b S	S 82 W	17.4	19.0	5.5	10.68	10.76	...	Inp.
5	.593	.486	.408	.4875	29.1	34.5	36.3	33.92	+ 4.55	.133	.149	.185	.155	.83	.75	.86	.79	W b S	S S E	S S W	S 36 E	1.5	8.5	5.0	3.84	4.55	Inp.	Inp.
6	.380	.265	.430	.3683	36.7	42.1	35.3	38.02	+ 8.95	.197	.232	.134	.189	.90	.86	.65	.81	S S W	S W b S	W S W	S 57 W	2.5	13.2	9.2	6.16	6.94	Inp.	1.0
7	.331	28.918	.236	.1602	31.3	35.6	30.6	31.70	+ 3.03	.160	.202	.123	.159	.90	.97	.72	.87	W S W	N W b N	W b S	S 80 W	1.0	4.0	24.0	11.60	15.37	0.465	1.8
8	.487	29.758	30.109	.8197	16.5	10.2	9.3	11.55	—16.92	.083	.046	.051	.057	.90	.65	.75	.75	W S W	W b S	W S W	S 74 W	22.5	30.5	17.2	22.33	22.67	...	0.1
9	30.224	30.219	30.044	30.1557	8.5	20.1	24.8	18.42	— 9.73	.060	.079	.085	.078	.93	.73	.63	.77	W b N	S E b E	E b S	S 74 E	11.6	3.2	19.2	9.12	10.66	...	4.0
10	29.729	29.598	29.622	29.6465	26.2	32.0	23.3	26.22	— 1.63	.124	.158	.110	.125	.87	.87	.87	.87	E S E	S S E	N N W	N 85 E	15.8	3.6	5.8	1.09	6.59	...	3.0
11	.415	.118	—	—	21.5	30.9	—	—	—	.109	.164	—	—	.94	.94	—	—	N	S W b S	W S W	S 83 W	7.6	15.0	19.5	10.21	17.15	...	5.0
12	.369	.731	.907	.6972	12.2	13.2	1.0	7.97	—19.38	.065	.054	.036	.048	.86	.67	.76	.74	W N W	W N W	W N W	N 69 W	22.5	22.6	1.5	10.57	10.65	...	...
13	.871	.571	.333	.5618	5.7	24.4	26.0	19.75	— 7.40	.053	.096	.133	.098	.93	.73	.95	.87	N W b N	S b E	W S W	S 30 W	6.4	12.4	9.8	9.10	11.67	...	1.0
14	.283	.489	.835	.5670	29.1	23.7	2.8	17.47	— 9.50	.141	.076	.044	.087	.87	.59	.89	.80	S W b W	W	N N W	N 74 W	12.5	24.0	2.5	9.86	10.78	...	0.2
15	.907	.785	.649	.7795	3.1	19.7	25.2	16.35	—10.42	.047	.080	.122	.084	.95	.76	.90	.87	N N W	N N W	S E b E	S 77 E	4.5	1.5	3.2	1.67	4.62	...	0.1
16	.733	.725	.640	.6967	23.3	28.4	32.4	27.62	+ 1.05	.110	.142	.176	.141	.87	.90	.96	.92	S W	W	E b S	S 85 E	3.5	0.5	5.8	1.85	4.02	Inp.	0.1
17	.649	.690	30.002	.7982	33.1	36.7	32.7	33.22	+ 6.85	.174	.189	.143	.164	.92	.86	.76	.85	E b N	S W b W	N W b W	N 76 W	1.5	9.8	6.0	5.13	6.41	...	...
18	30.060	.887	—	—	21.9	30.9	—	—	—	.105	.141	—	—	.89	.81	—	—	N N W	E	S E	N 80 E	5.0	13.0	7.0	6.59	7.88	0.175	...
19	29.237	.197	29.408	.2922	32.4	34.5	24.1	29.37	+ 3.30	.165	.137	.078	.121	.89	.68	.60	.71	S E b S	W	N W b W	N 79 W	4.0	22.5	24.5	15.78	16.74	0.015	0.1
20	.623	.529	.468	.5497	15.8	25.2	27.0	23.00	— 2.88	.078	.080	.115	.093	.88	.59	.77	.75	W b S	S S W	S W	S 54 W	7.5	10.2	10.0	8.14	8.45	...	...
21	.270	28.882	.002	.0487	25.1	26.6	17.6	21.58	— 4.20	.116	.134	.095	.111	.86	.93	.98	.93	W S W	E b N	N b W	N 2 E	1.5	12.4	21.0	11.76	15.52	...	10.0
22	.309	29.648	.747	.6060	0.3	5.0	0.6	1.40	—24.28	.038	.027	.040	.036	.85	.49	.88	.78	N W b N	N b W	W	N 37 W	25.5	18.5	10.5	11.70	12.77	...	...
23	.797	.669	.459	.6282	—1.6	16.8	17.6	11.62	—13.95	.039	.073	.095	.068	.94	.78	.98	.88	N	S W b W	W S W	S 65 W	2.8	13.5	7.4	10.58	11.03	...	0.1
24	.515	.667	.704	.6463	20.5	26.6	30.6	25.93	+ 0.45	.093	.112	.152	.120	.85	.77	.89	.84	W b S	W S W	S W	S 53 W	7.8	10.6	10.2	8.80	9.10	...	...
25	.661	.481	—	—	28.4	36.0	—	—	—	.134	.164	—	—	.86	.77	—	—	S S W	S S W	S W b S	S 33 W	7.5	3.0	14.0	7.75	7.85	...	0.2
26	.435	.400	—	—	34.9	36.7	—	—	—	.186	.171	—	—	.92	.78	—	—	W S W	W S W	S	S 8 E	1.2	1.0	1.5	0.51	0.90	...	...
27	.166	.015	.089	.0937	35.6	40.7	37.4	38.07	+12.78	.193	.223	.204	.206	.93	.87	.91	.90	E b S	S S E	S W	S 1 E	1.5	11.0	3.5	3.86	5.15	0.010	...
28	.136	.252	.319	.2408	33.8	29.1	27.8	29.85	+ 4.70	.173	.111	.126	.136	.89	.69	.84	.81	S W b S	W S W	W b S	S 76 W	2.5	17.4	3.5	8.29	8.62	...	...
29	.231	.213	.179	.2075	24.8	21.5	20.1	21.70	— 3.47	.105	.075	.085	.085	.79	.66	.78	.74	W b N	W	S W b W	S 84 W	11.2	15.5	9.2	10.56	10.97	...	0.1
30	.101	.155	.336	.2137	22.6	28.7	21.5	23.02	— 2.15	.110	.138	.095	.109	.92	.87	.82	.87	S W b W	S W b W	W N W	S 75 W	9.0	17.0	13.5	10.26	11.41	...	0.3
31	.520	.614	.745	.6430	12.5	20.1	15.1	15.00	—10.18	.062	.091	.068	.069	.80	.85	.78	.79	N	N W	W N W	N 54 W	7.0	15.0	15.2	7.46	7.90	...	...
M	29.5089	29.4871	29.5452	29.5198	22.75	27.82	24.47	24.66	— 2.43	.121	.127	.119	.121	.88	.76	.82	.82	....	....	....	....	7.92	12.85	10.29	.....	9.98	2.045	27.1

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR DECEMBER, 1864.

NOTE.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer..............................30.327 at 10 a.m. on 9th } Monthly range =
Lowest Barometer..............................28.854 at 4 p.m. on 21st } 1.473 inches.

Self-registing Thermom.
Maximum Temperature ....50°4 on p.m. of 3rd } Monthly range =
Minimum Temperature ....—10°4 on a.m. of 23rd } 60°8
Mean maximum Temperature .... 32°23 } Mean daily range=
Mean minimum Temperature .... 19°71 } 12°52
Greatest daily range ......31°4 from a.m. to p.m. of 23rd.
Least daily range........... 5°0 from a.m. to p.m. of 26th.

Warmest day .... 3rd... Mean temperature........... 41°48 } Difference = 40°08.
Coldest day ....22nd... Mean temperature .... 1°40 }
Maximum } Solar.................................. 94°5 on p.m. of 19th } Monthly range =
Radiation. } Terrestrial.......................—17°5 on a.m. of 23rd } 112°0
Aurora observed on 0 nights.
Possible to see Aurora on 10 nights; impossible on 21 nights.
Snowing on 18 days; depth 27.1 inches; duration of fall, 95.2 hours.
Raining on 9 days, depth 2.045 inches; duration of fall 36.5 hours.
Mean of cloudiness = 0.80; above average +0.05.
Most cloudy hour observed, 2 p.m.; mean = 0.90; least cloudy hour observed, midnight; mean, = 0.70.

Sums of the components of the Atmospheric Current, expressed in miles.

North.	South.	East.	West.
1359.44	1862.89	1212.54	4855.22

Resultant direction S. 82° W.; Resultant velocity 4.94 miles per hour.
Mean velocity ....9.98 miles per hour.
Maximum velocity .... 34.4 miles, from 11 a.m. to noon on 8th.
Most windy day ...... 8th............Mean velocity, 22.67 miles per hour. } Difference =
Least windy day......26th............Mean velocity, 0.90 ditto } 21.77 miles.
Most windy hour ...... 2 to 3 p.m.........Mean velocity, 12.83 ditto. } Difference =
Least windy hour ...... 4 to 5 a.m.........Mean velocity, 7.23 ditto. } 5.60 miles.

1st. Solar halo at 9 p.m.—3rd. Dense Fog 6 and 8 a.m.—4th. Solar halo 2 and 3 p.m.—8th. Solar parhelion 3.40 p.m.; very stormy day.—10th. Lunar halo 10 p.m. and midnight.—12th. Lunar halo at 10 p.m.—15th. Lunar halo at 6 a.m.; solar halo at 11 a.m.—17th. Dense fog 7 a.m. to noon.—21st. Severe storm of wind and snow continuing all day.—27th. Fog 6 and 8 a.m.

The month of December, 1864, was comparatively cold, wet, windy and cloudy; the depth of snow was also much above the average.

COMPARATIVE TABLE FOR DECEMBER.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above aver'ge (26°2)	Max. ob-served.	Min. ob-served.	Range.	No. of days.	Inches	No. of days.	Inches	Resultant. Direction.	Resultant. V'y.	Mean Force or Velocity.
	°	°	°	°	°							
1840	24.3	— 1.9	41.0	— 4.4	45.4	3	Inap.	18	...	...	...	....
1841	28.7	+ 2.5	45.5	+ 2.4	43.1	7	6.600	5	...	...	...	1.33 lbs.
1842	24.7	— 1.5	40.3	+ 3.8	36.5	3	0.880	17	...	...	...	0.61
1843	30.0	+ 3.8	41.1	+ 2.7	38.4	6	1.040	8	8.1	...	...	0.53
1844	28.2	+ 2.0	48.9	— 0.8	49.7	6	Imp.	6	4.2	...	...	0.40
1845	21.1	— 5.1	37.6	— 2.7	40.3	2	Inap.	12	4.7	...	...	0.70
1846	27.5	+ 1.3	49.2	+ 3.7	45.5	5	1.215	9	6.0	...	...	0.57
1847	30.1	+ 3.9	50.0	+ 6.6	43.4	7	1.185	8	6.8	...	...	0.35
1848	29.1	+ 2.9	49.1	+ 0.6	48.5	7	2.750	7	16.5	S 83° W	1.12	5.44mls.
1849	26.5	+ 0.3	41.3	— 5.2	46.5	5	0.840	12	9.6	N 82° W	2.56	6.23
1850	21.7	— 4.5	48.3	— 9.7	58.0	2	0.190	18	29.5	N 44° W	2.93	7.40
1851	21.5	— 4.7	43.8	—10.5	54.3	6	1.075	15	10.7	N 82° W	4.00	7.37
1852	31.9	+ 5.7	51.0	+13.9	37.1	7	3.995	10	20.1	S 69° W	1.03	6.54
1853	25.3	— 0.9	42.2	— 5.2	47.4	4	0.625	13	22.3	N 35° W	2.39	4.98
1854	21.9	— 4.3	41.8	— 5.9	47.7	5	0.590	12	17.2	N 44° W	4.30	8.56
1855	26.8	+ 0.6	45.9	— 2.1	48.0	6	1.845	10	29.5	S 88° W	5.29	11.38
1856	22.9	— 3.3	41.2	— 9.1	50.3	6	1.790	20	16.3	S 87° W	4.62	11.56
1857	31.9	+ 5.7	45.6	+ 5.7	39.9	7	3.205	14	9.0	N 39° W	2.51	6.84
1858	27.4	+ 1.2	43.6	+ 5.0	38.6	11	1.657	18	10.4	N 78° W	1.66	9.36
1859	17.9	— 8.3	54.8	— 3.3	58.1	3	1.035	23	37.4	N 53° W	4.29	10.77
1860	24.0	— 2.2	38.5	— 7.0	45.5	3	1.362	21	13.5	N 62° W	4.66	10.14
1861	31.1	+ 4.9	55.1	+ 5.7	49.4	6	0.560	8	6.8	N 72° W	3.50	7.96
1862	28.8	+ 2.6	50.0	— 2.3	52.3	5	1.945	8	10.4	N 73° W	3.17	7.58
1863	27.0	+ 0.8	51.5	+ 1.0	50.5	10	2.960	17	7.1	N 41° W	1.61	9.40
1864	24.7	— 1.5	46.8	— 2.3	49.1	9	2.045	18	27.1	S 82° W	4.94	9.98
Results to 1864.	26.20	...	45.76	—0.78	46.54	5.6	1.641	13.1	14.69	N 71° W	2.97	8.32
Exc. for 1864.	— 1.50	...	+ 1.04	—1.52	+ 2.56	+ 3.4	+ 0.404	+ 4.9	+ 12.41	....	......	+ 1.66

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST,—JANUARY, 1865.

Latitude—43 deg. 39.4 min. North. Longitude—5 h. 17 m. 33 s. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resul't. Direction.	Velocity of Wind.					Rain in inches.	Snow in inches.
	6 A.M.	2 P.M.	10 P.M.	Mean.	6 A.M	2 P.M	10PM	ME'N		6 A.M.	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A. M.	2 P. M.	10 P. M.		6 AM.	2 PM.	10 P.M.	Re-sul't.	ME'N		
					°	°	°	°	°												°							
1	29.820	29.776	—	—	5.3	17.6	—	—	—	.052	.076	—	—	.92	.79	—	—	N N E	Calm.	S W b W	S 66 W	1.8	0.0	12.5	7.07	8.33	...	Inp.
2	.606	.687	29.850	29.7280	21.5	28.4	19.0	21.65	— 3.55	.104	.084	.085	.086	.89	.53	.83	.74	S W b W	W b N	W N W	S 87 W	14.4	14.2	4.5	7.05	7.37	...	Inp.
3	.841	.687	.612	.7058	9.3	25.5	24.8	19.32	— 5.83	.056	.111	.105	.088	.84	.81	.79	.80	W N W	Calm.	W S W	S 83 W	1.5	0.0	6.5	4.90	5.38	...	Inp.
4	.673	.885	.886	.8185	20.5	14.3	7.1	13.53	—11.60	.074	.052	.053	.058	.67	.63	.88	.73	W N W	N N W	N W	N 43 W	19.5	13.0	1.3	7.16	10.01	...	0.1
5	.657	.436	.493	.5265	25.5	34.9	35.6	32.55	+ 7.42	.118	.132	.179	.144	.86	.65	.85	.77	S b E	S W b S	S S W	S 34 W	11.0	19.0	8.5	9.44	9.70	...	...
6	.519	.548	.484	.5155	35.2	30.2	22.3	28.33	+ 3.20	.183	.120	.094	.122	.89	.71	.78	.77	S W b W	N b E	N	N 2 W	3.5	9.0	15.0	11.82	11.99	...	...
7	.459	.735	30.034	.7653	5.3	9.6	3.5	5.90	—19.23	.046	.053	.040	.046	.82	.77	.75	.79	N b W	N N W	N b W	N 12 W	22.7	16.0	10.8	13.02	13.18	...	Inp.
8	30.090	.973	—	—	2.1	19.4	—	—	—	.039	.080	—	—	.80	.76	—	—	N b E	S S E	S S W	S 14 W	4.0	10.0	13.0	6.04	7.92	...	0.7
9	29.771	.761	29.781	.7702	27.3	32.7	29.1	29.25	+ 4.12	.139	.135	.148	.139	.94	.73	.92	.86	S W b S	S W b W	Calm.	S 50 W	13.5	4.5	0.0	4.63	5.71	...	1.5
10	.593	.319	.379	.4250	26.9	19.0	9.6	17.62	— 7.43	.131	.085	.053	.087	.89	.82	.77	.84	N E b N	N b E	N W b N	N 9 W	10.2	20.0	20.5	16.59	17.83	...	7.0
11	.550	.566	.615	.5897	2.4	16.5	19.4	12.35	—12.70	.047	.083	.087	.069	.96	.90	.83	.87	N W	S W b W	W S W	S 58 W	1.2	13.0	11.0	9.62	9.87	...	...
12	.644	.545	.589	.5943	22.3	27.0	28.4	25.52	+ 0.43	.107	.100	.119	.110	.89	.68	.76	.80	S W	S W	S W b W	S 53 W	15.0	19.8	9.0	12.77	12.87	...	...
13	.655	.543	.346	.4923	24.8	33.1	33.8	30.45	+ 5.37	.112	.145	.182	.146	.84	.76	.93	.85	S W b W	S W	S W b S	S 41 W	1.0	3.0	7.7	3.96	3.99	...	2.0
14	.114	.318	.446	.3085	31.3	17.6	11.4	18.47	— 6.63	.166	.064	.062	.089	.95	.65	.85	.83	W S W	N W b N	W N W	N 39 W	3.0	21.5	5.0	8.82	9.49	...	0.5
15	.449	.306	—	—	12.9	16.8	—	—	—	.069	.075	—	—	.89	.78	—	—	W N W	N	N	N 16 W	2.0	4.0	6.0	5.24	5.53	...	0.2
16	.423	.331	.268	.3305	—1.2	12.5	9.6	6.85	—18.15	.034	.067	.059	.053	.81	.88	.89	.85	N N W	S W b W	W N W	N 84 W	1.5	15.0	1.2	3.70	7.17	...	0.4
17	.177	.227	.416	.2893	5.3	6.4	—6.2	1.77	—23.25	.048	.044	.032	.041	.87	.75	.96	.85	N E b N	N	N N W	N 14 W	10.0	9.2	4.0	7.42	7.89	...	1.0
18	.546	.631	.727	.6457	—3.7	10.7	8.9	5.25	—19.72	.036	.047	.055	.045	.97	.65	.84	.81	W b N	W S W	S W b W	S 66 W	5.5	18.0	10.8	12.01	12.18	...	...
19	.744	.675	.717	.7202	10.7	15.4	11.4	11.90	—12.98	.064	.064	.062	.062	.92	.72	.85	.84	W b S	W S W	W b S	S 78 W	7.8	7.2	1.0	5.03	5.26	...	...
20	.833	.929	.886	.8928	11.1	21.5	24.4	17.63	— 7.22	.060	.088	.096	.079	.87	.77	.73	.79	W N W	S W b S	E S E	S 65 E	2.0	6.8	11.2	4.49	6.33	...	...
21	.805	.651	.591	.6742	24.8	25.5	25.2	24.98	+ 0.20	.105	.104	.122	.111	.79	.75	.94	.83	E b S	E b N	E N E	N 79 E	19.0	19.5	9.8	13.36	13.91	...	...
22	.541	.383	—	—	23.3	31.6	—	—	—	.116	.170	—	—	.93	.96	—	—	N E	E b N	E b N	N 30 E	9.0	7.0	1.5	1.36	7.03	0.440	1.0
23	.349	.284	.287	.3083	30.9	29.1	23.0	27.48	+ 2.82	.157	.141	.093	.131	.90	.87	.75	.85	W N W	N N W	W b N	N 66 W	10.0	3.0	15.5	8.37	9.89	...	0.2
24	.295	.281	.322	.3038	16.8	21.5	16.8	17.92	— 6.65	.073	.082	.080	.076	.78	.71	.85	.77	W S W	W b S	W S W	S 70 W	13.8	24.0	19.0	18.09	18.13	...	...
25	.347	.371	.381	.3713	11.8	12.9	11.8	11.92	—12.67	.058	.057	.063	.058	.77	.73	.86	.77	S W b W	W S W	S W b W	S 55 W	17.0	16.0	12.0	16.09	16.16	...	...
26	.347	.371	.429	.3812	12.9	12.5	6.9	10.42	—14.07	.063	.055	.050	.057	.80	.73	.84	.82	S W b W	S W b W	W S W	S 65 W	12.0	11.5	12.4	13.15	13.23	...	0.1
27	.424	.419	.485	.4437	3.9	11.4	6.4	7.42	—16.93	.045	.062	.044	.049	.86	.85	.75	.80	W b S	W S W	W	S 84 W	8.0	8.5	11.5	10.39	10.52	...	...
28	.513	.581	.740	.6310	7.5	20.1	22.6	16.92	— 7.38	.054	.085	.103	.081	.89	.78	.85	.82	N W	N W	N W	N 44 W	8.8	16.0	6.5	9.90	10.28	...	0.1
29	.903	.991	—	—	12.9	21.2	—	—	—	.057	.079	—	—	.73	.70	—	—	N W	W N W	N	N 39 W	1.8	8.5	3.5	4.86	5.23	...	...
30	30.167	30.133	30.071	30.1212	7.1	25.9	18.3	17.70	— 6.40	.048	.113	.087	.085	.79	.81	.87	.84	N b W	S W	W S W	S 56 W	0.5	7.5	7.2	4.33	4.49	...	...
31	29.989	29.938	29.956	29.9497	21.9	31.3	31.3	28.40	+ 4.42	.105	.144	.136	.132	.89	.81	.77	.84	S W b W	W S W	W S W	S 63 W	7.5	10.8	3.0	4.27	4.31	...	Inp.
M	29.5785	29.5712	29.6073	29.5886	15.85	20.98	17.48	17.75	— 7.05	.086	.089	.088	.086	.86	.75	.83	.81	....	....	....	....	8.02	11.47	8.43	......	9.39	0.440	14.8

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JANUARY, 1865.

Note.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely, at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer . . . . 30.191 at 10.30 a.m. on 30th } Monthly range=
Lowest Barometer . . . . 29.114 at 6 a.m. on 14th } 1.077 inches.
Self-registering Ther. { Maximum temperature . . . . 37.°2 on p.m. of 5th } Monthly range=
Minimum temperature . . . . —9.°0 on a.m. of 18th. } 46°2
Mean maximum temperature . . 24°60 } Mean daily range=14°52
Mean minimum temperature . . 10°09 }
Greatest daily range . . . . . . 31°4 from a. m. to p. m. of 5th.
Least daily range . . . . 2°4 from a. m. to p. m. of 26th.
Warmest day . . . 5th...Mean Temperature . . . 32°55 } Difference=30°.78
Coldest day . . . . 17th...Mean Temperature . . . 1°77 }
Maximum { Solar (Vacuum) . . . . . 93°0 on 24th } Monthly range=
Radiation { Terrestrial . . . . —18°2 on 18th } 111°.2
Aurora observed on 3 nights, viz.:—on 17th, 19th, and 29th.
Possible to see Aurora on 13 nights; impossible on 18 nights.
Snowing on 18 days; depth 14.8 inches; duration of fall, 66.8 hours.
Raining on 1 day; depth 0.440 inches; duration of fall, 10.0 hours.
Mean of cloudiness=0.70; below average, .02. Most cloudy hour observed, 2 p.m; mean=0.79; least cloudy hour observed, 10 p.m.; mean=0.62.

Sums of the components of the Atmospheric Current, expressed in Miles.

North.	South.	East.	West.
2221.06	1906.66	651.63	4206.33

Resultant direction, N. 85° W.; Resultant Velocity, 4.80 miles per hour.
Mean velocity 9.39 miles per hour.
Maximum velocity 25.6 miles, from 1 to 2 p.m. on 24th.
Most windy day 24th—Mean velocity 18.13 miles per hour. } Difference 14.14.
Least windy day 13th—Mean velocity 3.99 miles per hour. }
Most windy hour, 1 to 2 p.m.—Mean velocity, 11.72 miles per hour. } Difference
Least windy hour, midt to 1 a.m.—Mean velocity, 7.57 miles per hour. } 4.15 miles.

4th. Lunar halo from 7.30 p.m.
7th. Cold windy day.
10th. Heavy snow storm; stormy day.
12th. Lunar halo from 10 p.m.
13th. Solar halo at noon.
17th. Very cold day; auroral light from 7 p.m.
19th. Auroral light 10 p.m. and midnight.
22nd. Rain, sleet, and snow most of the day; foggy and damp 9 p.m.
29th. Auroral light and arch from 8 p.m. 30th. Foggy at 8 a.m.

The month of January, 1865, was very cold and dry, and comparatively mild.

COMPARATIVE TABLE FOR JANUARY.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above Average (23°6).	Maximum observed.	Minimum observed.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant. Direction.	Resultant. Velocity.	Mean Force or Velocity
1840	17.0°	— 6.6	40.6°	—13.8°	54.4°	4	1.395	11	...	...	...	...
1841	25.6	+ 2.0	41.7	— 4.1	45.8	2	2.150	14	...	...	...	0.36 lbs
1842	27.9	+ 4.3	45.8	1.3	44.5	5	2.170	9	...	...	...	0.78 "
1843	28.7	+ 5.1	54.4	1.5	52.9	6	4.295	12	14.2	...	...	0.69 "
1844	20.2	— 3.4	44.6	— 7.7	52.3	7	3.005	11	24.9	...	...	0.70 "
1845	26.5	+ 2.9	43.0	— 3.4	46.4	5	Imp.	9	22.7	...	...	0.70 "
1846	26.7	+ 3.1	41.2	0.3	40.9	5	2.335	10	6.0	...	...	0.55 "
1847	23.3	— 0.3	42.6	— 2.2	44.8	7	2.135	5	7.5	...	...	1.09 "
1848	28.7	+ 5.1	51.5	—12.0	63.5	7	2.245	8	7.1	N 82 W	2.03	5.82 ms
1849	18.5	— 5.1	40.1	—15.2	55.3	4	1.175	10	9.2	N 63 W	3.06	6.71 "
1850	29.7	+ 6.1	46.3	10.6	35.7	5	1.250	8	5.2	N 37 W	0.69	5.80 "
1851	25.5	+ 1.9	43.2	—12.8	56.0	4	1.275	10	7.8	S 77 W	3.26	7.69 "
1852	18.4	— 5.2	37.3	— 7.0	44.3	0	0.000	19	30.9	N 68 W	3.14	7.67 "
1853	23.0	— 0.6	40.9	— 6.6	47.5	1	0.290	6	7.5	N 27 W	2.52	6.34 "
1854	23.6	0.0	45.2	— 4.3	49.5	7	1.270	11	7.5	N 77 W	2.44	6.91 "
1855	25.9	+ 2.3	48.2	— 4.7	52.9	5	0.525	13	23.3	N 73 W	1.91	7.26 "
1856	16.0	— 7.6	33.1	—12.1	45.2	0	0.000	14	13.6	N 75 W	5.24	10.69 "
1857	12.8	—10.8	34.6	—20.1	54.7	3	Inap.	16	21.8	N 70 W	4.96	10.31 "
1858	30.0	+ 6.4	45.8	7.5	38.3	6	1.152	11	4.0	N 71 W	2.33	7.40 "
1859	26.4	+ 2.8	41.5	—26.5	68.0	6	1.449	19	16.4	S 81 W	3.17	8.76 "
1860	23.4	— 0.2	45.4	— 5.1	50.5	6	0.740	16	8.7	N 89 W	6.09	9.37 "
1861	19.9	— 3.7	34.5	— 7.0	41.5	4	0.685	23	20.6	N 86 W	2.92	9.30 "
1862	21.7	— 1.9	42.8	— 1.9	44.7	5	0.115	19	27.4	N 26 W	2.69	8.83 "
1863	28.1	+ 4.5	44.6	—11.2	55.8	10	1.122	17	20.6	N 61 W	1.13	7.23 "
1864	22.8	— 0.8	42.5	— 6.6	49.1	5	1.165	14	26.3	S 73 W	6.00	10.22 "
1865	17.7	— 5.9	35.6	— 6.2	41.8	1	0.440	18	14.8	N 85 W	4.80	9.39 "
Results to 1864.	23.61	...	42.86	—6.52	49.38	4.8	1.331	12.6	15.15	N 77 W	2.92	8.02
Exc. for 1865.	—5.86	...	—7.26	+0.32	—7.58	— 3.8	— 0.891	+ 5.4	— 0.35	...	...	+1.37

PROPERTY OF
AMERICAN ASSOCIATION
THE ADVANCEMENT

THE

CANADIAN JOURNAL

OF

INDUSTRY, SCIENCE, AND ART:

CONDUCTED BY

THE EDITING COMMITTEE OF THE CANADIAN INSTITUTE.

New Series.

No. LVII.

SMITHSONIAN INSTITUTION
MAY 28 1940
NATIONAL MUSEUM

MAY, 1865.

TORONTO:
PRINTED FOR THE CANADIAN INSTITUTE,
BY LOVELL AND GIBSON, YONGE STREET.

CANADIAN INSTITUTE.

EDITING COMMITTEE.

GENERAL EDITOR - - REV. WM. HINCKS, F.L.S.

I. *Geology and Mineralogy:* E. J. CHAPMAN, Ph.D., Prof. of Geology and Mineralogy, Univ. Coll. Toronto.

II. *Physiology and Natural History:* REV. WM. HINCKS, F.L.S., Prof. of Natural History, Univ. Coll., Toronto.

III. *Ethnology and Archæology:* DANIEL WILSON, LL. D., Prof. of History and English Literature, Univ. Coll., Toronto.

IV. *Meteorology:* G. T. KINGSTON, M.A., Director of the Magnetic Observatory, Toronto.

V. *Chemistry:* HENRY CROFT, D. C. L., Prof. of Chemistry and Experimental Philosophy, Univ. Coll., Toronto.

VI. *Mathematics and Natural Philosophy:* J. B. CHERRIMAN, M. A., Prof. of Natural Philosophy, Univ. Coll., Toronto; and the Rev. G. C. IRVING, M.A., Prof. of Mathematics, Trin. Coll., Toronto.

VII. *Engineering and Architecture:* SANDFORD FLEMING, C. E.

VIII. *Philology:* REV. E. HATCH, B.A., Prof. of Classics, Morin Coll., Quebec.

The Canadian Journal is printed exclusively for gratuitous distribution among the Members of the Canadian Institute, and such Institutions and Societies as the Council may determine; but Members may purchase extra copies at 2s. 6d. *per number, and Provincial Literary and Scientific Societies may obtain the Journal at the same rate, by an annual payment in advance.*

⁂ *Communications for the Journal to be addressed to the General Editor,* Prof. HINCKS, *Univ. Coll., Toronto. Communications on general business of the Institute, to be addressed to* U. OGDEN, *Esq., M.D., Corresponding Secretary, or to Mr. Jas. Johnson, Assistant Secretary, Canadian Institute, Toronto.*

☞ MR. EDWARD ALLEN, 12, Tavistock Road, Covent Garden, London, W, has been appointed the English Agent for the Institute. All European communications are requested to be forwarded through him.

THE CANADIAN JOURNAL.

NEW SERIES.

No. LVII.—MAY, 1865.

REMARKS ON PROFESSOR BOOLE'S MATHEMATICAL THEORY OF THE LAWS OF THOUGHT.

BY GEORGE PAXTON YOUNG, M. A.,
INSPECTOR OF GRAMMAR SCHOOLS FOR UPPER CANADA.

In a recent issue we announced the death of Professor George Boole, of Queen's College, Cork, a man of varied and profound acquirements, and of singular originality of mind. The work on which his fame will mainly rest is undoubtedly his "Investigation of the Laws of Thought, on which are founded the Mathematical Theories of Logic and Probabilities." We have long purposed to call attention to this remarkable production, though various circumstances have hitherto prevented us from doing so. The present seems a suitable occasion for testifying our admiration of the genius of the deceased philosopher, and, at the same time, endeavouring to give a brief account, inadequate as it must necessarily be, of what may be termed his Mathematico-logical speculations.

The primary, though not the exclusive, design of the "Investigation," is to express in the symbolical language of a Calculus, the fundamental Laws of Thought, and upon this foundation to establish the science of Logic and construct its method.

The elementary symbols of Professor Boole's Calculus are of three kinds: 1st. Literal symbols, as x, y, &c., representing the objects of our conceptions; 2nd. Signs of operation, as $+$, $-$, $\times$; and 3rd, the sign of identity, =. The sign + is used to express the mental operation by which parts (of extensive quantity) are collected into a whole. For instance, if x represent *animals*, and y *vegetables*, $x + y$ will represent the class made up of *animals and vegetables together*. On the other hand, the sign — is used to express the mental operation of separating a whole (of extensive quantity) into its parts. Thus, x representing *human beings*, and y representing *negroes*, $x - y$ will represent *all human beings except negroes*. With regard to the sign ×, $x \times y$ or $x\,y$ (as it may be written) is used to denote those objects which belong at once to the class x and to the class y; just as, in common language, the expression *dark waters* denotes those objects which are at once *dark* and *waters*. Hence we obtain a method of representing a concept taken particularly. For, if x denote *men*, then, since *some men* may be viewed as those who besides belonging to the class x belong also to some other class v, *some men* will be denoted by $v\,x$. In general,

$$v\,x = \text{some } x. \;\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

It can easily be shown, that, as in Algebra, so in the logical system which we are describing, the literal symbols, x, y, &c., are commutative; that is,

$$x\,y = y\,x; \;\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

and that they are also distributive; that is,

$$z\,(x \pm y) = z\,x \pm z\,y \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Another relation between Algebra and the Logical System under consideration is, that, in the latter as well as in the former, a literal symbol may be transposed from one side of an equation to the other by changing the sign of operation, + or —. But there is an important relation which subsists in the science of Thought, and not generally in Algebra, namely,

$$x^2 = x \;\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

That this is true in the Logical system, is plain; for x^2, which is another form of $x\,x$, denotes (by definition) those things which belong at once to the class x and to the class x; that is, it denotes simply those things which belong to the class x; and it is therefore identical with x. But though the equation (4) does not generally subsist in Algebra, it subsists when x is unity or zero. If, therefore, we take the science of Algebra with the limitation that its unknown quantities can receive no values distinct from unity and zero, the analogy between the two sciences will still be preserved.

It is necessary to observe that unity and zero (1 and 0) are virtually included by Professor Boole among his literal symbols. Of course we can give 1 and 0 any meaning we please, provided the meaning once imposed on them be rigidly adhered to. By 0, then, Professor Boole understands Nothing—a class (if the expression may be permitted) in which no object whatever is found. On the other hand, by 1 he understands the universe of conceivable objects. Thus 1 and 0 are at two opposite poles; the former including every thing in its extension; the latter, nothing. The meaning which has been affixed to 1 and 0 preserves, in the Logical system as in Algebra, the equations,

$$\left.\begin{array}{r} 1 \times x = x, \\ \text{and, } 0 \times x = 0; \end{array}\right\} \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

for, the meaning of the former is, that objects which are common to the universe and to the class x are identical with those which constitute the class x; and the latter means, that there are no objects which are common to a class in which nothing is found and to a class x: both of which propositions are self-evident. From the meaning affixed to 1, we see what the meaning of $1 - x$ must be. In fact, x and $1 - x$ are logical contradictories, the latter denoting all conceivable objects except those which belong to the former; so that

$$1 - x = \text{not } x \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

This value of the symbol 1 being admitted, we can, by the principles of transposition and distribution [see (3)] reduce equation (4) to the form,

$$x\,(1 - x) = 0 \ldots\ldots\ldots\ldots\ldots\ldots (7)$$

The law here expressed, which is termed the Law of Duality, plays a most important part in the development of logical functions, and in the elimination of symbols. In fact, it may be described as the germ out of which Professor Boole's whole system is made to unfold itself.

Having shown how concepts, whether taken universally or particularly, are represented, and also how the contradictory of a concept is represented, we have next to notice the manner of expressing judgments. All judgments are regarded by our author as affirmative; the negation, in those which are commonly called negative, being attached by him to the predicate. But an affirmative judgment is nothing else than an assertion, through immediate comparison, of the identity of concepts. Suppose, therefore, that we are required to express the judgment, "Some stones are precious." Let x denote *stones;* and y, *precious.* The proposition means, that some stones are identical with some precious things. Consequently, its symbolical expression [see (1)] is,

$$vx = vy.$$

If the judgment to be represented had been, "Some stones are not precious," its expression would [see (6)] have been

$$vx = v\,(1 - y).$$

These examples in the meantime may suffice. More complicated forms will present themselves afterwards.

With the few simple preliminary explanations which have been given, and which were necessary to render intelligible some of the criticisms presently to be offered, we are now prepared to state the view which our author takes of the science of Logic. Logic he regards as the science of Inference; and the problem which it seeks to solve is this: Given certain relations among any number of concepts (x, y, z, &c.), it is required to find what inferences can be drawn regarding any one of these or regarding a given function of any one of them. A properly constructed science of Logic would require to solve this problem adequately, and by a definite and invariable method. Now, Professor Boole claims that the view which he presents of the problem which Logic has to solve, is both deeper and broader than that commonly taken; and he claims at the same time that he has devised an adequate method, different from all existing methods, for solving this problem, and that his method is one of definite and invariable application.

The objections brought against the logic of the schools, that it is neither sufficiently deep nor sufficiently broad, will probably take our readers by surprise. It is not difficult to understand how a question might be raised as to the practical utility of the scholastic logic; but most persons who have examined the subject will be ready to admit, both that the scholastic logic is well founded, and that, when properly developed from its first principles, it forms a complete and perfect system. In the opinion of our author, however, it is so defective in its foundation, and so incomplete in its superstructure, as not to be entitled to the name of a science. "To what final conclusions," he says, "are we then led respecting the nature and extent of the scholastic logic? I think to the following: that it is not a science, but a collection of scientific truths, too incomplete to form a system of themselves, and not sufficiently fundamental to serve as the foundation upon which a perfect system may rest."

In order that it may be understood in what sense it is held that *the foundation of the scholastic logic is defective*, we make two other quotations. "That which may be regarded as essential in the spirit and procedure of the Aristotelian, and of all cognate systems of logic, is the attempted classification of the allowable forms of inference, and the distinct reference of those forms, collectively or individually, to some general principle of an axiomatic nature, such as the Dictum of Aristotle." Again: "Aristotle's Dictum de omni et nullo is a self-evident principle, but it is not found among those ultimate laws of the reasoning faculty to which all other laws, however plain and self-evident, admit of being traced, and from which they may in strictest order of scientific evolution be deduced. For though of every science the fundamental truths are usually the most simple of apprehension, yet is not that simplicity the criterion by which their title to be regarded as fundamental must be judged. This must be sought for in the nature and extent of the structure which they are capable of supporting. Taking this view, Leibnitz appears to me to have judged correctly when he assigned to the principle of contradiction a fundamental place in logic; for we have seen the consequences of that law of thought of which it is the axiomatic expression." The sum of what is contained in these passages, in so far as they bear on the point before us, is, 1st, That the foundation of the Aristotelian, and of all cognate systems of logic, is some such canon as the Dictum; 2nd, That that canon, and other maxims of a like description, though self-evident, are not deep enough to serve as a basis for a science of logic in which all the forms of thought are to be exhibited; and, 3rd, That the only principle sufficiently fundamental to form the basis of a complete science of logic is the principle of contradiction. Now what is the real state of the case? Nothing is more certain than that the Dictum was not considered by Aristotle as either the exclusive or the ultimate foundation of his logical system. Not the exclusive foundation; for, as a matter of fact, many of the forms of thought embraced in the Aristotelian logic receive no direct warrant from the Dictum, but can be derived from it only by the aid of the principle of contradiction. Not the ultimate foundation; for what is the Dictum, but a particular case of a more comprehensive, and (in this sense) more fundamental, law? Aristotle saw this, and has expressed it as clearly as any man that ever lived. "It is manifest," he says, "that no one can conceive to himself that the same thing can at once be and not be, for thus he would hold repugnant opinions, and subvert the reality of truth. Wherefore, all who attempt to demonstrate, reduce everything to this as the ultimate doctrine; for this is by nature the principle of all other axioms."

Professor Boole's acceptance of the Leibnitzian maxim (though it was much older than Leibnitz) that the true foundation of the science of logic is the principle of contradiction, has the appearance of being at variance with some extraordinary statements which he elsewhere makes, to the effect that the principle of contradiction is a consequence of the law of duality. We may remind our readers that the law of duality [see (4) and (7)] is substantially the principle out of which all the details of Professor Boole's own doctrine are evolved. Now, under the influence of what was, perhaps, not an unnatural desire to vindicate for his system a peculiar depth of foundation, Professor Boole has been betrayed into observations by which his fame as a philosophic thinker must be seriously affected. For instance: "that axiom of metaphysicians which is termed the principle of contradiction, and which affirms that it is impossible for any being to possess a quality and at the same time not to possess it, is a consequence of the fundamental law of thought, whose expression is $x^2 = x$." And again: "the above interpretation has been introduced, not on account of its immediate value in the present system, but as an illustration of a significant fact in the philosophy of the intellectual powers, viz., that what has commonly been regarded as the fundamental axiom of metaphysics is but the consequence of a law of thought, mathematical in its form." In thus speaking of the principle of contradiction as a consequence of the law of duality, Professor Boole seems to take away the fundamental character of the principle of contradiction; for, if that principle be, in the proper sense of the term, a consequence of something else, it cannot be itself truly fundamental. Yet, as we have seen, Professor Boole admits that it is the real and deepest foundation of the science of logic. What, then, does he mean? On the one hand, he certainly does not intend to deny that the principle of contradiction is self-evident. On the other hand, it is plain that he does hold that the principle of contradiction can be deduced from the law of duality. But (we ask) how? Can the principle of contradiction be deduced from the law of duality, without our assuming the principle of contradiction itself as the basis of the deduction? This would be absurd; for a conclusion can be established in no other way than by pointing out that the supposition of its being false involves a contradiction. In the particular case before us, the equation $x(1 - x) = 0$, which is that expression of the law of duality in which the principle of contradiction is regarded as being brought to light, is only reached by a process of reasoning, every step of which takes the principle of contradiction for granted. The only interpretation, therefore, which Professor Boole's words can bear, unless we give them a meaning palpably absurd, is, that a formula, which we are enabled to state by assuming the law of contradiction, contains a symbolic representation of that law. This hardly seems to us a very significant fact in the philosophy of the intellectual powers. If indeed the formula in question could be shown to represent some law of thought of wider application than the law of contradiction, that would be a very significant fact. But such is not the case. The equation $x(1 - x) = 0$ is just the law of contradiction symbolically expressed: neither more nor less.

The Aristotelian logic is charged with being *incomplete*, as well as with being not sufficiently fundamental. By this our author does not mean that Aristotle and his followers have casually omitted some forms of thought which their system ought to have embraced: had they done so, the fault would have been chargeable—not upon the system, but upon its expounders; but he means, that, from the very nature of the system, there is an indefinite variety of problems belonging to the science of inference, which their system is incapable of solving, or for the solution of which at all events it furnishes no definite and certain method.

It will be observed that there are two questions here, which, as radically distinct from one another, require to be considered separately: the one being, whether the Aristotelian logic is capable of solving all the problems belonging to the science of inference; and the other, whether it furnishes a definite and certain method for the solution of these.

The former of these questions may, with perfect confidence, be answered in the affirmative. It admits of absolute demonstration, that there is no chain of valid inference which the ordinary logic is incompetent to express, or, in other words, which is not reducible to conversion or syllogism. Some logicians have been of opinion that conversion is nothing else than syllogism at bottom; but, for what we have at present in view, it is unnecessary to discuss this question. Suffice it to say, that, whether conversion and syllogism be substantially identical or not, all immediate inference is of the nature of conversion, and all mediate inference (or reasoning proper) of the nature of syllogism. Does Professor Boole deny this? Formally, and in plain terms. "Possibly," he writes, "it may here be said that the logic of Aristotle, in its rules of syllogism and conversion, sets forth the elementary processes of which all reasoning consists, and that beyond these there is neither scope nor occasion for a general method. I have no desire to point out the defects of the common logic, nor do I wish to refer to it any further than is necessary, in order to place in its true light the nature of the present treatise. With this end alone in view, I would remark: 1st. That syllogism, conversion, &c., are not the ultimate processes of logic. It will be shown in this treatise that they are founded upon, and are resolvable into, ulterior and more simple processes which constitute the real elements of method in logic. Nor is it true that all inference is reducible to the particular forms of syllogism and conversion. 2nd. If all inference were reducible to these processes alone (and it has been maintained that it is reducible to syllogism alone), there would still exist, &c." In illustration of the statement, that some inference is not reducible to the forms of syllogism and conversion, Professor Boole examines the case of conversion, and arrives at the result that "conversion is a particular application of a much more general process in logic, of which," he adds, "many examples have been given in this work." In like manner he examines the case of syllogism; and his conclusion is as follows: "Here, then, we have the means of definitely resolving the question, whether syllogism is indeed the fundamental type of reasoning,—whether the study of its laws is co-extensive with the study of deductive logic. For if it be so, some indication of the fact must be given in the system of equations upon the analysis of which we have been engaged. No sign, however, appears that the discussion of all systems of equations expressing propositions is involved in that of the particular system examined in this chapter. And yet writers on logic have been all but unanimous in their assertion, not merely of the supremacy, but of the universal sufficiency of syllogistic inference in deductive reasoning." These statements, that conversion and syllogism are branches of a much more general process, have of course no meaning except on the supposition that the "much more general process" is not reducible to conversion and syllogism. If reducible to these, it would not be a more general process. Now we take our stand firmly on the position, that a chain of valid reasoning, which cannot be broken into parts, every one of which shall be an instance either of conversion or of syllogism, is not possible. We are prepared to show this in the case of every one of the examples of his "more general process" which Professor Boole gives in his work. Nay, we go farther, and as was intimated above, hold it to be absolutely demonstrable, that, from the nature of the case, inference cannot be of any other description than conversion or syllogism.

To make this out, let it be remarked that the conclusion of an argument exhibits a relation between two terms, say X and Y. It is an important assumption in Professor Boole's doctrine, that a proposition may exhibit a relation between many terms. This is not exactly true. A proposition may involve a relation between a variety of terms implicitly; but explicitly exhibits a relation only between two. Take, for instance, the proposition—"Men who do not possess courage and practise self-denial are not heroes." Here, on Professor Boole's method, a variety of concepts are supposed to be before the mind, as, *men, those who practise self-denial, those who possess courage*, and *heroes*. But in reality, when we form the judgment expressed in the proposition given, the separate concepts, *men, those who practise self-denial, those who possess courage*, are not before the mind; but simply the two concepts, *men who do not possess courage and practise self-denial*, and *heroes*. What is a judgment but an act of comparison? And the comparison is essentially a comparison of two concepts, each of which may no doubt involve in its expression a plurality of concepts, but these necessarily bound together by the comparing mind into a unity. Now, if the conclusion of an argument exhibits a relation between two terms X and Y, this conclusion must be drawn (what other way is possible?) either through an immediate comparison of X and Y with one another, or by a mediate comparison of them through something else. If it be drawn by an immediate comparison of X and Y, then no concepts enter into the argument except X and Y, and the argument is reduced to conversion. But if the conclusion be drawn mediately, it must be by the comparison of X and Y with some third thing: not with a plurality of other things, but with some single thing. Here we have the mind drawing its inference in a syllogism. What the various admissible forms of conversion and syllogism may be, or whether these forms have been correctly specified by particular eminent logicians, are minor questions. The essential thing in a philosophical respect is, that the mind, in the inferences which it draws, does and can work in no other moulds than those described. All this seems to us so plain that we confess ourselves utterly puzzled to comprehend how men of profound and original genius have been beguiled into an assertion of the contrary.

Professor Boole himself, in summing up his assault on the Aristotelian Logic, comes very near admitting what we contend for. "As Syllogism," he says, "is a species of elimination, the question before us manifestly resolves itself into the two following ones: 1st. Whether all elimination is reducible to Syllogism; 2nd. Whether deductive reasoning can, with propriety, be regarded as consisting only of elimination. I believe, upon careful examination, the true answer to the former question to be, that it is always theoretically possible so to resolve and combine propositions that elimination may subsequently be effected by the syllogistic canons, but that the process of reduction would in many instances be constrained and unnatural, and would involve operations which are not syllogistic. To the second question I reply, that reasoning cannot, except by an arbitrary restriction of its meaning, be confined to the process of elimination." With regard to this second question, we merely note in passing, that we have proved in the preceding paragraph that inference, where not immediate or of the nature of conversion, can be nothing else than elimination. It is, however, with the first question, whether elimination is reducible to syllogism, that we have now more particularly to do; and we accept with satisfaction the admission, guarded and (to some extent) neutralised as it is, that every line of argument may be thrown into a form in which the eliminations that take place are effected by the syllogistic canons. It is quite irrelevant to notice, as Professor Boole does, that the process of reduction would, in many instances, be constrained and unnatural; for we are not here in the province of Rhetoric. Much more to the purpose is the charge, that the process of reduction would involve operations which are not syllogistic. The operations referred to are those embraced in the "much more general process" in which, as we have seen, our Author holds conversion and syllogism to be contained. Of course, the ground which we take in reply is, on the one hand, to challenge the production of an instance of valid inference, which cannot be reduced to either conversion or syllogism; and on the other hand, to fall back upon the demonstration which we have given of the absolute impossibility of valid inference being anything else than conversion or syllogism.

In stating the charge of incompleteness brought by our Author against the Aristotelian system, we explained his meaning to be, that, from the very nature of the system, there is an indefinite variety of problems belonging to the science of inference, which the system is incapable of solving, or for the solution of which, at all events, it furnishes no definite and certain method. We have, we trust, fully refuted the opinion that there are problems in the science of inference which the Aristotelian logic is incapable of solving. But Professor Boole urges, that, even if all inference were reducible to conversion and syllogism, "there would still exist the same necessity for a general method. For it would still be requisite to determine in what order the processes should succeed each other, as well as their particular nature, in order that the desired relation should be obtained. By the desired relation I mean that full relation which, in virtue of the premises, connects any elements selected out of the premises at will, and which, moreover, expresses that relation in any desired form and order. If we may judge from the mathematical sciences, which are the most perfect examples of method known, this directive function of method constitutes its chief office and distinction. The fundamental processes of arithmetic, for instance, are in themselves but the elements of a possible science. To assign their nature is the first business of its method, but to arrange their succession is its subsequent and higher function. In the more complex examples of logical deduction, and especially in those which form a basis for the solution of difficult questions in the theory of probabilities, the aid of a directive method, such as a Calculus alone can supply, is indispensable."

Now, we at once admit that the Aristotelian logic neither has, nor professes to have, any such method as that here described. But can it justly, on that account, be charged with incompleteness? A science must not, because it does not teach everything, be therefore reckoned incomplete: enough, if it teaches the whole of its own proper circle of truths. The special question which the scholastic logic proposes to itself is: what are the ultimate abstract forms according to which all the exercises of the discursive faculty proceed? The science is complete, because it furnishes a perfect answer to this question.

But, it may be said, is it not desirable to have a method enabling us certainly to determine, in every case, the relation which any of the concepts explicitly or implicitly entering into a group of premises bear to the others? Most desirable. And herein consists the real value of Professor Boole's labours. He has devised a brilliantly original Calculus by which he can, through processes as definite as those which the Algebraist applies to a system of equations, solve the most complicated problems in the science of inference—problems which, without the aid of some such Calculus, persons most thoroughly versed in the ordinary logic might have no idea how to treat. In expressing our dissent, as we have been obliged very strongly to do, from much that is contained in Professor Boole's treatise, we have no desire to rob that eminent writer of the credit justly belonging to him. Our wish has been simply to separate the chaff from the wheat, and to point out accurately what constitutes, as far as the "Investigation" is concerned, Professor Boole's claim to renown.

Our readers will, however, be now anxious to obtain some fuller information regarding the method about which so much has been said, and which is the same with "the more general process" under which the processes of the scholastic logic are held by Professor Boole to be comprehended. This part of our article must necessarily be altogether technical; and we shall require to ask our readers to take a few things on trust; but we hope to be able to present the subject in such a manner as to give at least some idea of the system we are to endeavour to describe. Those who desire to become thoroughly acquainted with it will of course study the "Investigation" for themselves.

We begin by referring to the development of logical functions. An expression which in any manner involves the concept x, is called a function of the concept, and is written $f(x)$. Now there is one standard form to which functions of every kind may be reduced. This form is not an arbitrary one, but is determined by the circumstance that every conceivable object must rank under one or other of the two contradictory classes x and $1 - x$. Hence every conceivable object is included in the expression,

$$ux + v(1 - x); \qquad (8)$$

proper values being given to u and v. For, if a given concept belong to the class x, then, by making $v = 0$, the expression (8) becomes ux, which, by (1), means *some* x; and if the given concept belong to the class $1 - x$, then, by making $u = 0$, the expression (8) becomes $v(1 - x)$, which, by (1) and (6), means *some not* x. Therefore, $f(x)$ being any concept depending on x, we may put

$$f(x) = ux + v(1 - x) \qquad (9)$$

It has been shown that one of the coefficients, u, v, must always be zero; but the forms of these coefficients may be determined more definitely. For, by making $x = 0$ in (9), the result is $v = f(0)$; and by making $x = 1$, there results $u = f(1)$; by substituting which values of u and v in (9), we get

$$f(x) = f(1)x + f(0)(1 - x) \qquad (10)$$

This is the expansion or development of the function x. The expressions x, $1 - x$, are called the constituents of the expansion; and $f(1)$ and $f(0)$ are termed the coefficients. The same phraseology is employed when a function of two or more symbols is developed.

Any one in the least degree acquainted with mathematical processes will understand how the development of functions of two or more symbols can be derived from equation (10). In fact, by (10), we have

$$f(x, y) = f(1, y)x + f(0, y)(1 - x).$$

But again, by (10),

$$f(1, y) = f(1, 1)y + f(1, 0)(1 - y),$$

and

$$f(0, y) = f(0, 1)y + f(0, 0)(1 - y).$$

$$\therefore f(x, y) = f(1, 1)xy + f(1, 0)x(1 - y)$$
$$+ f(0, 1)y(1 - x) + f(0, 0)(1 - x)(1 - y) \qquad (11)$$

The development of a function of three symbols may be written down, as we shall have occasion in the sequel to refer to it:

$$\begin{aligned} f(x, y, z) = {} & f(1, 1, 1)\, xyz + f(1, 1, 0)\, xy\,(1 - z) \\ & + f(1, 0, 1)\, xz\,(1 - y) + f(1, 0, 0)\, x\,(1 - y)\,(1 - z) \\ & + f(0, 1, 1)\, yz\,(1 - x) + f(0, 1, 0)\, y\,(1 - x)\,(1 - z) \\ & + f(0, 0, 1)\, z\,(1 - x)\,(1 - y) \\ & + f(0, 0, 0)\,(1 - x)\,(1 - y)\,(1 - z) \quad \ldots\ldots\ldots(12) \end{aligned}$$

As the object of the expansion of logical symbols may not be evident at first sight, and as the process may consequently be regarded by some as barbarous, we may observe that not only is there a definite aim in the development, but the thing aimed at, has, in our opinion, been most felicitously accomplished. Of this our readers will probably be satisfied when they are introduced to some specimens of the use which is made of the formulæ obtained; in the meantime it may throw some light on the character of these formulæ if we notice that the constituents of an expansion represent the several exclusive divisions of what our author terms the universe of discourse, formed by the predication and denial in every possible way of the qualities denoted by the literal symbols. In the simplest case, that in which the function is one of a single concept, it will be seen by a glance at (10) that there are only two such possible ways, x and $1 - x$. In the case of a function of two symbols, there are [see (11)] four such ways, xy, $x\,(1 - y)$, $y\,(1 - x)$, $(1 - x)\,(1 - y)$. In a function of three symbols there are eight such ways; and so on. A development in which the constituents are of this kind prepares the way for ascertaining all the possible conclusions, in the way either of affirmation or denial, that can be deduced, regarding any concept, from any given relations between it and the other concepts.

If S be the sum of the constituents of an expansion, and P the product of any two of them, then

$$S = 1, \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (13)$$

$$\text{and } P = 0. \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (14)$$

The truth of these beautiful and important propositions will easily be gathered by an intelligent reader from an inspection of the formulae, (10), (11), (12). Another important proposition is involved in (14), namely, that, if $f(x) = 0$, either the constituent or the coefficient in every term of the expansion of $f(x)$ must be zero. For, let

$$f(x) = Q + A\,X + A_1\,X_1 + \ldots\ldots\ldots + A_n\,X_n\,;$$

where A, A_1, &c., are the coefficients which are not zero, their corresponding constituents being X, X_1, &c.; while Q represents the sum of those terms in which the coefficients are zero. Then we say that

$$X = 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (15)$$

For, since $Q = 0$, and $f(x)$ is supposed to vanish,

$$A X + A_1 X_1 + \&c. = 0$$

$$\therefore A X^2 + A_1 X X_1 + \&c. = 0$$

But, by (14), $X X_1 = X X_2 = \ldots\ldots\ldots = X X_n = 0$. Therefore

$$A X^2 = 0.$$

But A is not zero. Therefore X must be zero.

These principles having been laid down, our best course will probably now be to take a few examples, and to offer in connection with them such explanations as may seem necessary of the mode of procedure which they are intended to illustrate.

Our first example shall be one in which but a single proposition is given: "clean beasts are those which both divide the hoof and chew the cud." Let

x = clean beasts,
y = beasts dividing the hoof,
z = beasts chewing the cud.

Then, the given proposition, symbolically expressed, is,

$$x = y z,$$

or, by transposition,

$$x - y z = 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots (16).$$

This premiss contains a relation between three concepts; and, according to Professor Boole, a properly constructed science of inference should enable us, by some defined process, to show what consequence, as respects any one of these, follows from the premiss. Now, the definite and invariable process which Professor Boole applies, with the design which has been indicated, to an equation such as (16), is to develop the first member of the equation. Writing, then,

$$f(x, y, z) = x - y z,$$

$$\text{we have, } f(1, 1, 1) = 0,$$

$$f(0, 0, 0) = 0,$$

and so on. Hence [see (12)] the developement required is

$$\begin{aligned} x - y z = {} & x y (1 - z) + x z (1 - y) \\ & + x (1 - y)(1 - z) - y z (1 - x) \\ & + 0 x y z + 0 y (1 - x)(1 - z) \\ & + 0 z (1 - x)(1 - y) \\ & + 0 (1 - x)(1 - y)(1 - z). \end{aligned}$$

Therefore, by (16),

$$xy(1-z) + xz(1-y) + x(1-y)(1-z) - yz(1-x) = 0:$$

and therefore, by (15),

$$\left.\begin{aligned} xy(1-z) &= 0. \\ xz(1-y) &= 0, \\ x(1-y)(1-z) &= 0, \\ yz(1-x) &= 0. \end{aligned}\right\} \cdots\cdots\cdots\cdots\cdots\cdots (17)$$

Still farther, since, by (13), the sum of the constitutents of an expansion is unity; and since four of the constituents in the expansion of $x - yz$ have been shewn to be zero; it follows that the sum of the remaining constituents in the expansion of $x - yz$ is unity. That is,

$$xyz + y(1-x)(1-z) + z(1-x)(1-y) + (1-x)(1-y)(1-z) = 1. \ldots\ldots (18)$$

It is obvious that this method can be applied in every case. To what then does it lead? First of all, in the group of equations (17), we have brought before us all the different classes (if the expression may be permitted) to which the given proposition warrants us in saying that nothing can belong; and next, in equation (18) we have brought before us those different classes to one or other of which the given proposition warrants us in asserting that everything must belong. For instance, the first of equations (17) denies the existence of beasts which are clean (x) and divide the hoof (y) but do not chew the cud ($1 - z$); the second denies the existence of beasts which are clean (x) and chew the cud (z) but do not divide the hoof ($1 - y$); and so on. Equation (18), again, informs us that the universe, which is represented by 1, is made up of four classes, in one or other of which therefore every thing must rank; the first denoted by xyz, the second by $y(1-x)(1-z)$; and so on. As an example of the interpretation of the expressions by which these classes are denoted, we may take the last, $(1-x)(1-y)(1-z)$. This represents things which are neither clean beasts, nor beasts chewing the cud, nor beasts dividing the hoof.

By the method employed, we have been able to indicate certain classes which do not exist, and also to indicate certain classes in one or other of which every thing existing is found. But this, it may be said, is not a solution of the most general problem of inference. The most general problem is: to express (speaking mathematically) any one of the symbols entering into the given premiss, or any function thereof, as an explicit function of the others. To the problem as put even thus in its widest generality, Professor Boole's processes extend. It would make our article too lengthened were we to go into minute details; but we must endeavour to give some idea of the course here followed, as it both is extremely interesting as a matter of pure speculation, and forms an important part of the system under consideration.

Take the equation in (16), $x - yz = 0$; and, as a simple instance will serve the purpose of illustration as well as a complicated one, let the inquiry be: how can z be expressed in terms of x and y? In ordinary Algebra we should have

$$z = \frac{x}{y} \text{ ....(19)}$$

But though both sides of an equation may, in Logic as in Algebra, be multiplied (so to speak) by the same quantity, they cannot, in Logic, be legitimately divided by the same quantity. For instance, let the objects common to the class X and to the class U be identical with those common to the class Y and to the class U; in other words, let

$$UX = UY;$$

it does not follow that X is identical with Y, or symbolically, that

$$X = Y.$$

Hence equation (19) could not, in Logic, be legitimately deduced from (16), even if y were an explicit factor of x. But still further, when x has not y as one of its factors, the expression $\frac{x}{y}$ is not, in the logical system, interpretable. Nevertheless, Professor Boole shows that conclusions both interpretable and correct will *ultimately* be arrived at, if the value of z be deduced Algebraically, as in (19), and the expression $\frac{x}{y}$ be then, as a logical function, subjected to development. Now, if $\frac{x}{y}$ be developed by (11), and the expansion equated to z, we get

$$z = xy + \tfrac{1}{0}x(1-y) + 0(1-x)y + \tfrac{0}{0}(1-x)(1-y) \text{......(20)}$$

Here we have two symbols, $\frac{0}{0}$ and $\frac{1}{0}$, the meaning of which has not yet been determined. Our author shows that the former, which in Algebra denotes an indefinite numerical quantity, denotes in the logical system an indefinite class. In Algebra $\frac{1}{0}$ denotes infinity; and, as is well known, when it occurs as the co-efficient in a term in an equation all of whose other terms are finite, this indicates that the quantity of which it is the co-efficient is zero. So, in the logical system, if, in any term of an equation obtained in the manner in which equation (20) has been obtained, the co-efficient be $\frac{1}{0}$, the corresponding constituent must be 0. These are certainly very remarkable analogies. But let us see what follows. We have first, from (20),

$$x(1-y)=0.$$

Hence as the equation (20) describes the separate classes of which z consists, and as there is no such class as $x(1-y)$ in existence, the second term on the right hand side of equation (20) may be rejected. The third term also may be omitted, its co-efficient being zero. This reduces the equation to the form,

$$z = xy + \tfrac{0}{0}(1-x)(1-y):$$

which means, that beasts which chew the cud consist of the class xy, together with an indefinite remainder of beasts common to the classes $1-x$ and $1-y$.

Before leaving the subject of inference from a single premiss, we must say a few words regarding elimination; for though, in Algebra, elimination is possible only when two or more equations are given, Professor Boole, shows that, in Logic, a class symbol may be eliminated from a single equation. In fact, elimination from two or more premises is ultimately reduced by our author to elimination from a single premiss. And yet, as if to preserve the analogy between Algebra and Logic, even where the two sciences seem to differ most widely from one another, the possibility of eliminating x from a single premiss in the latter science, arises from the circumstance, that, in that science the equation previously referred to as expressing the Law of Duality always subsists; and it is by the combination of that equation with the given proposition that the elimination of x from the given proposition is effected. For let the given proposition be

$$f(x)=0 \text{.................................} (21)$$

Then, by (10),

$$f(1)x+f(0)(1-x)=0.$$

$$\therefore x\{f(0)-f(1)\} = f(0),$$

$$\text{and, } (1-x)\{f(0)-f(1)\} = -f(1).$$

$$\therefore x(1-x)\{f(0)-f(1)\}^2 = -f(0)f(1).$$

But, by the Law of Duality, $x(1-x)=0$. Therefore

$$f(0)f(1) = 0 : \dots\dots\dots\dots (22)$$

which is the result of the elimination of x from equation (21). We cannot pause to give examples of the use of the formula (22); but we must quote an interpretation of it, viewed as the result of the elimination of x from (21), which strikes us as extremely elegant. The formula implies that either $f(0) = 0$, or $f(1) = 0$. Now the latter equation $f(1) = 0$ expresses what the given proposition $f(x) = 0$ would become if x made up the universe; and the former $f(0) = 0$ expresses what the given proposition would become if x had no existence. Hence, (22) being derived from (21), it follows that *what is equally true whether a given class of objects embraces the whole universe or disappears from existence, is independent of that class altogether.*

The principle of elimination is extended by our author to groups of equations, by the following process. Let

$$\left.\begin{array}{l} T = 0, \\ V = 0, \\ U = 0, \\ \dots\dots \end{array}\right\} \dots\dots\dots\dots (23)$$

be a series of equations, in which T, U, V, &c., are functions of the concept x. Then

$$T^2 + V^2 + U^2 + \&c. = 0. \dots\dots (24)$$

It is shown by Professor Boole that the combined interpretation of the system of equations (23) is involved in the single equation (24). Indeed, had all the terms in the developments of T, V, U, &c., been such as to satisfy the Law of Duality, it would have been sufficient to have written

$$T + V + U + \&c. = 0.$$

In order now to eliminate x from the group (23), it is sufficient to eliminate it, by the method described in the preceding paragraph, from the single equation (24); and, if the result be

$$W = 0,$$

this equation will involve all the conclusions that can legitimately be derived from the series of equations (23) with regard to the mutual relations of the concepts, exclusive of x, which enter into these equations.

We do not see how it is possible for any one not blinded by prejudice against every thing like an alliance of Logic with formulæ and processes of a mathematical aspect to deny that these are very remarkable principles. By way of instance, we select from the work under review the following problem, in which two premises are given. Let it be granted, first, that the annelida are soft-bodied, and either naked or enclosed in a tube; and, next, that they consist of all invertebrate animals having red blood in a double system of circulating vessels. Put

A = annelida, s = soft-bodied animals,
n = naked, t = enclosed in a tube,
i = invertebrate, r = having red blood in &c.

Then the given premises are

$$A = vs\left\{n(1-t) + t(1-n)\right\}, \ldots\ldots (25)$$

$$A = ir \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (26)$$

Suppose the problem then to be: to find the relation in which soft bodied animals enclosed in tubes stand to the following elements, viz., the possession of red blood, of an external covering, and of a vertebral column. Professor Boole would doubtless have granted that this problem admits of being solved by what he calls the ordinary logic; but he would probably have contended that the ordinary logic does not possess any definite and invariable method of solution. A skilful thinker may be able to find out how syllogisms may be formed so as ultimately to give him the relation which soft bodied animals enclosed in tubes bear to the elements specified; but what of thinkers who are not very skilful? How are they to proceed? In Professor Boole's system, the process is as determinate, and as certain of leading to the desired result, as the rules for solving a group of simple equations in Algebra. Eliminate v, the symbol of indefinite quantity, from (25). Reduce (25), thus modified, and (26), to a single equation, by the method described in a previous paragraph. The equation is

$$A\left\{1 - sn(1-t) - st(1-n)\right\} + A(1-ir) + ir(1-A) + nt = 0.$$

Then, since the annelida are not to appear in the conclusion, we must eliminate A, by (22), from this equation. This will be found to give us

$$ir\left\{1 - sn(1-t) - st(1-n)\right\} + nt = 0.$$

And ultimately we get

$$st = ir(1-n) + \tfrac{0}{0}\,i(1-r)(1-n) + \tfrac{0}{0}(1-i)(1-n);$$

the interpretation of which is: *Soft bodied animals enclosed in tubes*

(st) consist of all invertebrate animals having red blood (ir) and not naked ($1 - n$), *and an indefinite remainder* ($\frac{0}{0}$) *of invertebrate animals* (i) *not having red blood* ($i - r$) *and not naked* ($1 - n$) *and of vertebrate animals* ($1 - i$) *which are not naked* ($1 - n$).

We have entered so fully into the explanation of Professor Boole's system in its bearing on what he terms Primary (virtually equivalent to Categorical) Propositions, that we cannot follow him into the field of Secondary (virtually equivalent to Conditional, that is, Disjunctive and Hypothetical) Propositions. Nor is it necessary that we should do so; for our object is not to give a synopsis of the "Investigation," but simply to make the nature of the work understood; and, for that purpose, what has been said is sufficient. The application of the Calculus to Secondary Propositions is exceedingly similar, in respect not only of the general method followed, but even of the particular formulæ obtained, to its application to Primary. All that is peculiar in the treatment of Secondary Propositions arises from the introduction of the idea of Time. For instance, the proposition, "If X is Y, A is B," is held to be not substantially different in meaning from this: "the time in which X is Y, is time in which A is B." Such being the fundamental view taken, symbols like x and y are used to represent the portions of time in which certain propositions (e.g., X is Y, A is B) are true. Then, the symbol 1 denoting the universe of Time, or Eternity, the expressions, $1 - x$, $1 - y$, will denote those portions of time respectively in which the propositions, X is Y, A is B, are not true; and so on.

The extension of his method, by Professor Boole, to the theory of Probabilities, is a splendid effort of genius on the part of the author, and furnishes a most convincing illustration of the capabilities of the method. The part of the "Investigation" which is devoted to this subject, is much too abstruse to admit of being here more particularly considered; but, to show what the method can accomplish—though the bow of Ulysses perhaps needs the arm of Ulysses to bend it—we may simply state one of the problems of which Professor Boole gives the solution. "If an event can only happen as a consequence of one or more of certain causes, $A_1, A_2, \ldots\ldots, A_n$, and if generally C_1 represents the probability of the cause A_1, and p_1 the probability that, if the cause A_1 exist, the event E will occur, then the series of C_1 and p_1 being given, required the probability of the event E."

To those who have followed us thus far, it will be evident what final judgment we are to pass on the work under review. On the one hand, as a contribution to philosophy, in the strict sense of that term, it does not possess any value. Professor Boole distinctly, though modestly enough, avows the opinion, that, in his "Investigation," he has gone deeper than any previous inquirers into the principles of discursive thinking, and that he has thus thrown new light on the constitution of the human mind. We are sorry to be unable to accept this view. But, on the other hand, Professor Boole is entitled to the praise of having devised a Method, according to which, through definite processes, it can be ascertained what conclusions, regarding any of the concepts entering into a system of premises, admit of being drawn from these premises. This Method depends on a Calculus, original, ingenious, singularly beautiful both in itself and in its relations to the science of Algebra, and capable (in hands like those of its inventor) of striking and important applications. In a word, the merit of the Treatise lies in that part of it which has nothing to do with the Laws of Thought, but which is devoted to showing how inferences, from data however numerous and complicated, and whatever be the matter of the discourse, can be reached through definite mathematical processes.

THE MOHAWK LANGUAGE.

BY ORONHYATEKHA.

When I was requested to prepare a paper concerning the language of my people, to be read before your learned body, I readily assented; not because I was not fully sensible of the difficulty of the task, or that I was not painfully aware of my own inability to do a subject of so much importance anything like full justice: but in the hope that I might be able to contribute something which may prove of some assistance to those whose inquiries may be turned in the same direction.

It will not be expected, in a short paper liket his, that more can be done than merely to give a brief introduction to the subject in hand, trusting that future opportunities may be afforded to further prosecute the work. While it is my design to direct your attention mainly to the Language, it may not be amiss to give at the outset a general outline of the history of the Mohawks.

They are the head Tribe of the *Confederacy of the Six Nations*, and, like the other Indian tribes of this continent, their origin is involved in mystery.

The only source which has not been exhausted, from which we can derive any information, at present within reach, is the Indian traditions. They are, however, so mythical in their character, as touching the origin of the Indian, that but little, if any, reliance can be placed on them. I may say, however, that they all teach that the Red Man was created upon this continent; and were I to weigh the evidence given by these traditions, and that derived from the various theories of scientific writers upon the subject, I should be inclined, after making all allowances for the legendary character of Indian History, to decide in favour of the evidence of tradition. For I am disposed to attach but little weight to theories founded upon supposed similarity in manners and customs, or accidental resemblance in words of the language. I do think, however, that there is every reason to hope that we shall find, if not a solution of this difficulty, at least great assistance from the science of language.

I know that the traditions of the Mohawks assume a rational and reliable character with the formation of the Confederacy of the Five Nations by the Mohawk Chief De-ka-na-wi-dah. Yet, the Tuscaroras are completely lost sight of in all the earlier traditions of the Five Nations, and are represented to have first met the Mohawks when they joined the Confederacy at a comparatively recent date. An examination, however, of the two languages leaves no room to doubt that at some remote period these two nations were one.

Here, therefore, we have a case where we are enabled, by a knowledge of, and an examination into the languages, to pronounce judgement, with absolute certainty, upon a point which goes farther back than tradition. I should be placing a low estimate to say that the confederacy is 500 years old. Philology, therefore, immediately solves a question for us in relation to events from 600 to 1000 years old. Leaving, however, this question of our origin for discussion till we are in a position to bring the science of language to bear upon it, we will proceed to give a hasty view of the confederacy of which we have already made mention.

I have said that it was first conceived by De-ka-na-wi-dah, at a time when the nations which subsequently formed the League were living in separate and independent communities, continually engaged in hostilities with each other. The Chief, thoroughly satisfied that a confederation of the neighboring tribes would result in mutual benefit and prosperity, made proposals to the Oneida for an alliance, to which the latter fortunately acceded without hesitation.

They next proceeded to the Onondaga, who at that time was the most powerful of the neighboring tribes. Having received the proposition of the Mohawk and Oneida, to form an alliance in which all should be equal, the Chief rejected it, as he was then more powerful and had more influence than they, and by entering the alliance he would be brought down to an equality with them. Determined, however, to carry out the confederation scheme, the Mohawk and Oneida tendered the Onondaga the office of "Fire Keeper" in the new council they would form. This giving him the sole authority of opening or closing the Councils of the Five Nations, and a veto power upon all transactions of the confederate chiefs, induced the Onondaga to yield. The Cayugas and Senacas were subsequently added and thus completed the scheme of confederation of the Five Nations: a lasting evidence of their wisdom, and that they were entitled to the name of statesmen much more than many "pale-faces" of the present day. From the consummation of this scheme, the "new nationality" steadily, though slowly, increased in prosperity and power, till about the time of the settlement of the English at Jamestown, when they had reached the zenith of their power and glory. Their hunting grounds extended from the Great Lakes, upon the north, to the Cumberland River and Cherokee country upon the south, and east of the Mississippi. They subdued nation after nation till their name was known and their arms dreaded by nearly all Indian tribes east of the Rocky Mountains.

With what has occurred to us since we came in contact with the pale-faces, most of you are familiar, and I need say but a few words.

At the time that New Amsterdam changed masters, was formed that alliance with the English which has been kept inviolate by the Mohawks unto this day. The Indians were engaged in all the wars that took place upon this continent for the possession of Canada, between the English and French, and to them England, most undoubtedly owes her possessions in America. Their fidelity and the strength of their friendship will better appear when it is taken into consideration that they had not only no personal interest to serve, but also tempting offers were frequently made to them by the foes of England, to remain at least neutral. But their invariable reply was: "When my brother is glad, we rejoice; when he weeps, we weep also."

At the close of the revolutionary war, the Mohawks—having throughout fought for their brother the King, though the American Government generously offered them the undisturbed possession of their territory,—left their "hunting grounds and the graves of their forefathers," and sought a new home in the wilds of Canada, in order still to preserve their alliance with their great brother, the King.

A portion settled upon the shores of the Bay of Quinté, where there are now about 700, while the remainder passed up to their present reservation at the Grand River, numbering at the present day about 2,500. So, again, in the War of 1812, these people gave good evidence, at "Beaver's Dam," "Lundy's Lane," and "Queenston Heights," that the spirit of their forefathers had not entirely died out. As illustrating the "ruling passion," strong even in the din and smoke of battle, the father of the writer, who took a leading part in all the engagements on the Niagara Frontier, being present at the burning and sacking of Buffalo, selected from a rich, varied, and costly assortment, as his share of the plunder, *a keg of rum*.

With this bare outline, we shall now proceed with our subject proper.

Although all the traditions represent the Six Nations as originally separate and distinct tribes, there can be no doubt of their common origin when we come to examine the dialects.

The migration of a family, away from the rest, and living in isolation, would, in time, give the dialectic differences now existing among the languages spoken by the Six Nations. If this be true, we must naturally suppose that the greatest similarity would be found to exist between the languages spoken by tribes located contiguous to each other, and on the contrary the greatest dissimilarity between the languages of tribes that are most remote from each other. On reference to the geographical position of the tribes, we find that, according to this, the Mohawk and Oneida ought to be most alike.

An examination will prove this fact; while the Tuscarora differs more from the Mohawk than any of the others. For the Chiefs of the Mohawks, Oneidas, Onondagas, Cayugas and Senacas speak each in his own language in the Council House and are readily understood by all. But the speech of a Tuscarora Chief usually has to be interpreted into one or other of the five dialects before it can be understood by the Council.

Our first inquiries must be directed, as a matter of course, to the alphabet of the leading language, viz: the Mohawk, and attention will at once be arrested by a curious peculiarity, in the entire absence of the labials which, in English, are so prominent.

I ought, perhaps, here to explain that the name Mohawk was given to us by foreigners, and that the signification or derivation is entirely unknown to us. Some writers, I believe, have conjectured it to mean *man eaters*; but if it is implied by this that the Mohawks were Cannibals, I have no hesitation in pronouncing it to be a libel.

The name by which we are known among Indians is, perhaps, not quite so euphonious, but much more complimentary. It is *Ka-nyen-ke-há-ka* which means "Flint People" or "people derived from the flint," given no doubt by those who had experienced something of the flinty character and the scalping propensities of the Mohawk upon the war-path. The following comprises all the letters of the alphabet; viz:

Vowels.

a	as	*a*	in	far.
e	"	a	"	fate.
i	"	e	"	meet.
o	"	o	"	old.
u	"	u	"	tune.

Vowels followed by h have a short quick explosive sound, *e g.*, *eh* as *e* in met; *ih* as *i* in pin.

E followed by n has the sound of *u* in under.

Consonants.

d h j k n q r s t w x y.

It will thus be seen that b c f g l m p v z are wanting, leaving 17 letters in the alphabet.

Writers who have gone before me have, as a general thing, retained c and q, but I conceive uselessly, as I think where those former writers would employ these letters, j and k could be used quite as correctly.

It will be my object, not so much to exhibit the language in some particular form, or according to certain preconceived grammatical notions, as to examine and analyze the language, and afterwards deduce rules founded upon such analysis. With most of the works upon the subject, that I have been able to examine, I have found this difficulty—that instead of truly exhibiting the language as it exists, it has been distorted and made to assume new forms to suit the purposes of the author.

In order to indicate the connection between the language of the Mohawks and the other dialects of the Six Nations, I have prepared a comparative table of the numerals, and of a few common words, from which it will be seen that the Mohawk and Oneida are most alike, while the Tuscarora is most dissimilar from the rest.

—	MOHAWK.	ONEIDA.	ONONDAGA.	CAYUGA.	TUSCARORA.
1	En-ska	En-ska	Ska-dah	Skat	En-jih.
2	De-ke-nih	De-ke-nih	De-ke-nih	Dek-nih	Ne-ktih.
3	Ah-senh	Ah-senh	Ah-senh	Ah-senh	Ah-senh.
4	Ka-ye-rih	Ka-ye-lih	Ka-ye-ih	Ke-ih	En-dah.
5	Wisk	Wisk	Wiks	Wi-sh	Whisk.
6	Ya-yak	Ya-yak	Ah-yak	Hye-ih	O-yak.
7	Ja-dah	Ja-dah	Ja-dah	Ja-dak	Ja-nah.
8	Sa-de-konh	De-ke-ronh	De-kenh	De-krunh	Na-krunh.
9	Tyo-donh	Wa-deh	Wa-donh	Dyo-ton	Ni-renh.
10	O-ye-rih	O-ye-lih	Wa-senh	Wa-senh	Wa-senh.
11	En-ska-ya-wen-reh	Combined same as in Mohawk, only using *l* wherever *r* occurs in the Mohawk.	Ska-dah-ka-he	Skat-ska-reh	En-jih-ska-reh.
12	De-ke-nih-ya-wen-reh		Dé-ke-nih-ka-he	Dek-nih ska-reh	Ne-ktih-ska-reh.
20	De-wa-senh		De-wa-senh	De-wa-senh	Ne-wa-senh.
21	De-wa-senh-en-ska-ya-wen-reh		De-wa-senh-ska-dah-ka-he	De-wa-senh-skat-ska-reh	Ne-wa-senh-en-jih-ska-reh.
22	De-wa-senh-de-ke-nih-ya-wen-reh		Ah-senh-ni-wa-senh	Ah-senh-ni-wa-senh	Ah-senh-di-wa-senh.
30	Ah-senh-ni-wa-senh		Ka-ye-ih-ni-wa-senh, &c	Ke-ih, &c., &c	En-dah-di-wa-senh, &c.
40	Ka-ye-rih-ni-wa-senh				
50	Wisk-ni-wa-senh				
60	Ya-yak-ni-wa-senh				
70	Ja-dah-ni-wa-senh				
80	Sa-de-konh-ni-wa-senh				
90	Tyo-donh-ni-wa-senh				
100	En-ska-de-wen-nya-weh		Ska-dah-de-wen-nya-eh-weh	Skat De-wen-nya-weh	Ka-ya-swih.
150	$\underbrace{\text{En-ska}}_{\text{One}}$ - $\underbrace{\text{de-wen-nya-weh}}_{\text{Hundred}}$ - $\underbrace{\text{nok}}_{\text{and}}$ - $\underbrace{\text{wisk-ni-wa-senh}}_{\text{Fifty.}}$		Similar to the Mohawk.		
200	De-ke-nih-de-wen-nya-weh		De-ke-nih-de-wen-nya-eh-weh		
Man	Ron-kwe	Lon-kwe	Ha-ji-nah	Ha-ji-nah	Ra-ni-ha.
Woman	Yon-kwe	Yon-kwe	E-henh	Kunt-swi-sah	Ka-nen-wenh.
Boy	Rax-ha	Lax-ha	Hak-sa-ah	Hak-sa-ah	Ra-ka-senh.
Girl	Kax-ha	Ex-ha	Ek-sa-ah	Ex-ha-ah	Ya-ken-wa-ston.
Husband (my)	De-ya-ke-ni-de-ronh	De-ya-ke-ni-de-lonh	De-ya-ke-ni-de-onh	Ho oh	Ro-ho.
Wife (my)	" " "	" " "	" " "	De-ya-ke-ni-ya-seh	Ke-ho.
Father (my)	Ra-ke-ni-ha	La-ke-nih	Khe-ni-ha	Ha-nih	Ri-enh.
Mother (my)	Is-ten-ah	Ah-ke-nol-ha	Ah ke-no-ha	Kno-ha	Kwi-renh.

—	Delaware.*	—	Delaware—*Continued.*
1	En-kwi-ta.	50	Naw-lou-nach-kenh.
2	Ni-sha.	60	En-kwi-tash-ta-nach-kenh, &c.
3	N-ghah.	100	En-kwi-ta-poh-kenh.
4	Ni-wah.	175	$\underbrace{\text{En-kwi-ta}}_{\text{One}}\text{-}\underbrace{\text{poh-kenh}}_{\text{Hundred}}\ \underbrace{\text{wak}}_{\text{and}}$ $\underbrace{\text{ni-shash-ta-nach-kenh}}_{\text{Seventy}}\ \underbrace{\text{wak}}_{\text{and}}$ $\underbrace{\text{nau-lon.}}_{\text{Five.}}$
5	Nau-lon.		
6	En-kwi-tash.		
7	Ni-shash.		
8	Nghash.		
9	Nole.		
10	Wi-mbut.		
11	En-kwi-ta-nih.		
12	Ni-sha-nih.		
13	Nghah-nih.	Man	Lin-non.
14	Ns-wa-nih.	Woman	Ah-kwi.
15	Naw-lon-na nich.	Boy	Ska-hen-tson.
16	En-kwi-tash-ta-nich.	Girl	Oh-kwi-*sis* (little woman.)
17	Ni-shash-ta-nich.	Husband	Ni-tah-wun-mask.
18	Nghash-ta-nich.	Wife	Ni-tah-wun-mask.
19	Nole-ta-nich.	Father	Noch.
20	Ta-kwi-na-cheh.	Mother	En-gik.
21	Ta-kwi-na-cheh-wak-en-kwi-ta, &c.	Son	We-quo-shein.
		Daughter	En-da-nish.
30	Ngheh-nach-kenh.	Day	Ki-ish-koh.
40	Ni-wah-nach-kenh.	Night	Pi-shak.

From the above table we can readily see that the numerals are combined according to the decimal system of notation, and that in the language of the Six Nations they counted as far as ten, and then began to combine, as *ten and one, ten and two,* &c. ; while in the Delaware language they counted only as far as five. For the form *En-kwi-tash* = 6 is evidently allied to *Enkwita* = 1, and so of *Nishash* = 7 and *Nisha* = 2, &c.

Although there does not appear to be much connection between the Mohawk *O-ye-rih*=10, and *De-wah-senh*=20 ; yet when we come to look at the forms for ten in the other languages with which it is allied, we readily recognize in *De-wah-senh* the words *De-ke-nih* + *Wa-senh :* — two-tens.

The addition of the ending *Ya-wen-reh* to *one, two,* &c., to express *eleven, twelve,* &c., is peculiar to the Mohawk and Oneida. The form for the other languages—as in Cayuga †*Wa-senh-skat-skareh,* simply means *ten* and *one piled on* in the sense of added. I am at a loss to trace the Mohawk and Oneida form *Ya-wen-reh* ; it may be derived from *O-ye-rih* = 10, but more likely from *De-ya-wen-rénh* = *over,* in the sense of overflowing, more than enough. You will have noticed the peculiarity in the Oneida, in the substitution of *l* where *r* is used in the remaining dialects; in fact this seems to be its principal difference from the Mohawk. The initial R, and Y or R seem to have some connection with the gender, as, for instance, *On-kwe* for mankind, in contradistinction from *Kar-yoh* = beast, is changed into man by simply prefixing R, and into woman by simply prefixing Y. So we have *Ex-ha* = child, *Rax-ha* = a boy, and *Kax-ha* = a girl.

---

* The writer is indebted for the *Delaware* to an educated young Indian of that tribe (Mr. Albert Anthony). Every possible care has been taken to guard against errors; and, it is believed, that the examples given are as near correct as possible.

† *Wa-senh* is usually understood.

Before subjecting a verb through its various forms it may help us to understand some of the changes which it undergoes, by first looking at the pronouns and nouns.

Singular.	*Dual.*
I — I-ih.	We — Un-ke-non-ha.
My — Ah-kwa-wenh.	Ours — Un-kya-wenh.
Me — I-ih	Us — ——————

Plural.
We — Un-kyun-ha.
Ours — Un-kwa-wenh.
Us — ——————

Singular.	*Dual.*	*Plural.*
Thou — I-seh.	You — Se-non-ha.	You — Jon-ha.
Thy — Sa-wenh.	Yours — Ja-wenh.	Yours — Se-wa-wenh.
He — Ra-on-ha.	They — Ro-non-ha.	Thy — Ro-non-ha.
His — Ra-o-wenh.	Theirs — Ra-o-na-wenh.	Theirs — Ra-o-na-wenh

Singular.	*Dual and Plural.*
She, or it — A-on-ha.	They — O-non-ha.
Hers, or its — A-o-wenh.	Theirs — A-o-na-wenh.

There is another form for *she* and *hers* applied to those for whom we entertain love, respect, or esteem, viz: she = ah-ka-on-ha, hers = ah-ko-wenh, in which we have introduced the *k* we have already mentioned, as having some connection with the feminine gender. There is but one form for the nominative and accusative cases. But the chief peculiarity is the existence of a dual element; as, however, we shall see this more clearly when we come to consider the verbs, it may perhaps be better to proceed to an examination of the verbs before saying anything of this peculiarity of the language.

We shall find great difficulty in our process of analyzing and tracing the words, from the great tendency to agglutination which exists in all of the dialects of the Six Nations. We shall frequently meet with compound words, in which the character of the original elements are so entirely changed, or so little left of them, that it will require the utmost caution to keep clear of error. It may be better, where such cases occur, not to attempt an analysis, rather than incur the risk of misleading in the matter.

As an example of their tendency to run words together, as well as showing how the possessive of nouns are formed, we have—my apple = *ah-kwa-hih* which is evidently a compound of the pronoun my = ah-kwa-wenh and apple = ka-hih, but instead of using the full form, *ah-kwa-wenh* + *ka hih,* we have the last syllable of the pronoun, and the first of the noun elided, and we get *ah-kwa-hih.* So in the 2nd and 3rd persons we have

Siugular.

Thy apple = *Sa-hih* from *Sa-wenh* + *Ka-hih.*
His apple = *Ra-o-hih* " *Ra-o-wenh* + *Ka hih.*
Her apple = *Ah-ko-hih* " *Ah-ko-wenh* + *Ka-hih.*
Her or its apple = *A-o-hih* " *A-o-wenh* + *Ka-hih.*

		Dual.		*Plural.*
	Our apple,	Un-kya-hih.		Un-kwa-hih.
	Your "	Ja-hih.		Se-wa-hih.
Male,	Their "	Ra-o-na-hih.	Male,	Ra-o-na-hih
Neuter or female,	Their "	A-o-na-hih.	Female or neuter,	A-o-na-hih.

The rule which may be deduced from the above with reference to the formation of the possessive case of nouns, I think, will be found general. In many cases, however, we shall find that the final syllable of the pronominal part of a compound word, or rather of the possessive, is modified, doubtless for the sake of euphony and according to certain general rules.

Take any number of words, as bow = *Ah-en-nah,* arrow = *Ka-yen-kwi-reh,* Tommahawk = *Ah-do-kenh,* Knife = *Ah-sa-reh,* shoes = *Ah-dah,* and form their possessive cases, and we shall, I think, find that the same general rule applies to all, *e.g.*:

My Bow, Ah-kwa-en-nah.
Thy " , Sa-en-nah.
His " Ra-o-en-nah.
Her " Ah-ko-en-nah.
Her or its A-o-en-nah.

In this example we find that precisely the same rule applies as in the first instance given, and we need go no further than the singular, as the formation of the dual and plural is quite regular. Take the next word, arrow.

My	Arrow,	Ah-kyen-kwi-reh.		
Thy	"	Sa-yen	"	"
His	"	Ra-o-yen	"	"
Her	"	Ah-ko-yen	"	"
Her or its	"	A-o-yen	"	"

			Dual.					*Plural.*			
	Our	Arrow,	Un-ke-ni-yen-kwi-reh					Un-kwa-yen-kwi-reh			
	Your	"	Se-ni-	"	"	"		Se-wa-	"	"	"
Male,	Their	"	Ra-o-di-	"	"	"	Male,	Ra-o-di	"	"	"
Female or neuter.	Their	"	A-o-di-	"	"	"	Female or neuter.	A-o-di	"	"	"

Here we have a slight change in the first person singular, by the coalescing of the last syllable of the pronominal with the first of the substantive element, and instead of having *Ah-kwa-yen-kwi-reh,* as we should, we get *Ah-kyen-kwi-reh.* We also have a change in the dual, and in all probability, this form of the dual is the primary, as far as the two given are concerned, and the more correct form. I think we shall find hereafter, in various forms of the verb, that the *ni,* in the first and second persons and *di* in the third person, are the proper dual element, which we may hereafter be able to trace to *De-ke-nih*—two.

The following are the possessive forms for the remaining three words :—

	Tommahawk.			*Knife.*			*Shoe.*	
My	Ah-kwa-do-kenh,			Ah-kwa-sa-reh,			Ah-kwah-dah.	
Thy	Sa-	"	"	Sa-	"	"	Sah-	"
His	Ra-o-	"	"	Ra-o-	"	"	Ra-oh-	"
Her	Ah-ko-	"	"	Ah-ko-	"	"	Ah-koh	"
Hers or its	A-o-	"	"	A-o-	"	"	A-oh	"

The formation of the dual and plural follow thoughout, the same rule as the first example given.

It will be seen that in the 3rd person plural there is a variation from the English in there being a distinction made in the Mohawk with regard to the gender of the possessor, when such possessor is of the human species. That arises from their being two forms—a masculine and a feminine—for the pronoun *their.* When in speaking of both genders, as a boy or girl, in the expression—"their book," we would use the masculine form. There is no distinction beween the nominative and accusative forms. Reference has already been made to a masculine, feminine and neuter gender.

We shall find that the masculine and feminine are confined entirely to mankind, and that the initial R seems to be in some way connected, as already mentioned, with the masculine, while with the feminine K and Y are used, *e.g.*

R-on-kwe—man.	*Y*on-kwe—woman.
*R*ih-yen-ah—my son.	*K*he-yen-ah—my daughter.
*R*ax-ah—boy.	*K*ax-ha—girl.

We have already pointed out the existence of two forms of the feminine, confined I believe to the singular. There is one form applied to those whom we esteem as to a mother, and there is a general form which, perhaps, may be more properly regarded as a *common gender*, as it is the form used when speaking of the beasts of the field, and applied without distinction of gender. This form is used when speaking in general terms of the female sex.

The common gender is confined entirely to the brute creation, where no masculine or feminine exists, as I stated in the formation of the possessive case, whenever we are speaking of both sexes as man and woman we use the masculine dual or plural form as the case may be.

There are in nouns, contrary to what we should expect from what we have seen of the pronouns, only two numbers, the singular and the plural, there being no dual.

The formation of the plural is quite simple and uniform, being effected in two ways, according as the word represents an animate or inanimate being. For the former we add to the singular the termination *o-konh*, *e.g.* Ya-ko-sa-tens = horse, Ya ko sa tens-*o-konh* = horses, On-kweh = mankind On kweh-*o-konh.* For the inanimates we add *o-kon-ah*, *e.g.*: ah-sa-reh, knife; ah-sa-reh-*o-kon-ah,* knives; ah-dah, shoe; ah-dah-*o-kon-ah*, shoes.

There are a few exceptions where the animate form is applied to inanimates, and we may be able, after a more extended observation, to point out the rules that govern these exceptions.

With this brief introduction I leave this subject for some future occasion, and shall close by translating one or two words whose signification may interest you.

The name *Oh-nya-ka-ra,* "on or at the neck," is applied to the whole stream of water between Lakes Erie and Ontario, and is derived from *O-nya-ra,* "neck" or *contraction* between head and trunk.

The Mohawks applied this name to the *neck-like* contraction between the two lakes, and hence we have *Niagara.*

In one of the excursions of the Mohawks they are reported to have found themselves in the Bay of Toronto. Casting their eyes, they saw as it were, in every direction, trees standing in the water, hence they called the place *Ka-ron-to,* "trees standing in the water," and from which, doubtless, you get your *Toronto,* while Ontario is supposed to be from *Ken-ta-ri-yoh,* "placid sheet of water."

ON THE COMPOSITION, STRUCTURE AND DEVELOPMENT OF BONE.

BY M. BARRETT, M.A., M.D.

It cannot fail, I trust, to prove interesting, at the present time, to collect and compare the several observations and experiments which have been made within the last few years upon the development and mode of growth of bony tissue. My especial purpose, however, in the following remarks, is to bring before the notice of the meeting some important experiments made within the last few years by Dr. Ollier, and which are fully recorded in the Journal de Physiologie for 1859, edited by Brown Séquard. I am persuaded that their important bearing on histology, and the kindred sciences, will ensure their due consideration. To most members of the medical profession these observations are already known, having reached them through the several journals specially devoted to medical science. No points of histological enquiry are at the present day unworthy of our most earnest attention, since it is only by carefully exploring the ground, which we seem or may be thought already to possess, that any real advance can be made in that science upon which rests the whole superstructure of physiology.

Before entering, however, more especially upon the consideration of the subjects in view, it may not be amiss to give a very brief account of the general structure of bone, in order that every one may be enabled to form an opinion of the nature and importance of the observations and experiments about to be submitted.

Bone varies in density according to its situation and the purpose it has to fulfil, being, in some parts of the same bone, light and porous, whilst in other portions it is exceedingly compact and heavy : thus the diaphysis or shaft of a long bone is compact, while the extremities are light and porous. The specimens before you illustrate these extreme conditions existing in separate bones ; the heavier is from the head of the Greenland whale, the other is a lumbar vertebra from the adult human subject. The contrast between the two is most striking. Although great diversity exists between bones, in respect to their density, yet there is a wonderful similarity of internal structure throughout the bones of mammalian animals. Dismissing, however, minor peculiarities, it will be well, for the purposes of description, to assume as a type of bony tissue, the shaft of the human femur of the adult.

We find the shaft of the bone to be invested by a membrane which, in some places, is more firmly adherent than in others. This membrane consists externally of white fibrous tissue, having a subjacent layer of cells, termed the periosteum. It sends numerous processes into the deep structure of the bone, affording sheaths to the capillary vessels and nerves, so that when torn from the bone, these lacerated processes give to the attached surface of the periosteum an appearance of roughness. The external surface of the periosteum gives attachment to the fibrous tendons of muscles which interlace with the fibres of the periosteum. Cutting through the fresh or living bone, at right angles to the direction of the axis of the shaft, we find a large central space called the medullary canal, and which is occupied by a fatty substance, the medulla or marrow. We observe, also, that the cut surface of a living bone bleeds from several pores, that is, from the mouths of the vessels contained within their respective canals. If the bone be submitted to the long continued action of fire, all the organic matter of the bone, consisting of fibrous tissue, blood, fat, &c., is burned away, the earthy matter alone remaining ; the bone, however, still preserves its original shape, but has lost about 20 per cent. in weight, so that the earthy matter in the femur of the human adult constitutes about 80 per cent of the total weight of the bone.

A chemical examination of the inorganic residuum shows it to consist of the triple phosphate of lime together with carbonate of lime, and a small quantity of phosphate and carbonate of magnesia.

But we may proceed to analyze the bone by another method. If we submit it to the prolonged action of dilute hydrochloric or nitric-acid, then all the earthy matter is set free from the organic matter, and still the bone retains its original form, but is now pliant. By this means we preserve the organic constituents of bone separated from the earthy matter.

The next step in our enquiry into the structure of bone must be by the aid of the microscope. A transverse, thin and transparent section shows it to be perforated by numerous canals, each of which gives passage to a blood vessel; around each of these canals, called Haversian, as from a centre, we witness a number of concentric lamellæ, the position of which is marked out especially by certain bodies or minute spaces, in shape somewhat like a melon seed, and known as lacunæ. Proceding from the margins or borders of these lacunæ, we notice a number of exceedingly fine waving lines, indicating the presence of minute canals, termed canaliculi.

If we make a thin section of the bone, parallel to its axis, we no longer see the mouths of these Haversian canals with their surrounding lamellæ; but we find the same canals running longitudinally, and the lacunæ presenting their longer axes. We observe also that these canals communicate freely with one another, or in other words frequently anastomise. We learn, from the presence] of these numerous canals, that a free circulation exists in bone; that while the blood, as such, finds ready passage through the Haversian canals, the plasma of the blood, or the blood without its larger particles (the blood corpuscles) can be readily transmitted to the ultimate constituents of the bony substance; so that all and every particle of bone is so situated as to be able to receive nutrition from the sanguineous fluid, and also can remit into the general current certain portions of its waste.

If we make a transverse section of bone, reduce it by grinding to a transparent condition, and then, resting it upon a piece of platinum foil, subject it to a degree of heat sufficient to dissipate the organic matter; we may observe, by the aid of the microscope, that the lacunæ have been rendered very indistinct, and that the canaliculi have for the most part disappeared. If, on the other hand, we submit a transverse section of the same bone to the action of dilute acids, nitric or hydrochloric, we shall find, on examination, that the lacunæ and canaliculi are still distinctly visible. In the former case we destroy the organic tissue of the bone, retaining only the earthy matter, while in the latter we have removed the earthy matter and preserved the organic only. This obliteration of the lacunæ and canaliculi, by the action of heat, is a proof that the lacunæ, with their canaliculi, are lined with an organic membrane, in other words that an organized tissue permeates the deepest portions of the bone.

Thus the supply of blood to the bone is furnished by means of the periosteal capillaries. The marrow of the bone possesses a circulation independent of the periosteal vessels. We notice in the diaphysis or shaft, a foramen which gives passage to an artery, this artery, on reaching the medullary canal, divides into two branches, one to supply the upper, and the other the lower portions of the medulla. The foramen or aperture is usually styled the nutritious foramen of the bone, a misnomer, as you perceive, since the vessel to which it gives passage is not destined to supply the bony tissue, but simply the contents of the medullary canal.

Let us now proceed to the special consideration of the periosteum ; before doing so, however, it may be well to mention that, in reference to the structure and purpose of this tissue, much difference of opinion exists. Todd & Bowman, in their work on Physiological Anatomy, a deservedly received text-book with the medical profession, say: " Perhaps few questions have more divided the minds of physiologists than that regarding the share taken by the periosteum in the growth and regeneration of bone." Dr. Sharpey was probably the first to advance the opinion that (Carpenter's Principles of Human Physiology, p. 279, 1853, American Edition,) " bone continues to increase in diameter, by the formation of new layers upon its exterior, and that these layers are formed, not, as usually stated) in a cartilaginous matrix, but in the substance of a membrane that intervenes between the proper periosteum and the surface of the bone, consisting of fibres and granular cells."

The following experiments fully establish this idea of Sharpey's, they were conducted by Dr. Ollier during the year 1858, and may be found recorded in the January number for 1859 of the Journal de Physiologie, edited by Brown Séquard.

The idea was generally entertained, previous to the observations of Sharpey, that bone always originated in a cartilaginous matrix, and that cartilage of necessity preceded the formation of bone. Now it is well known that bone may be developed from fibrous tissue, a familiar instance of this fact is witnessed in the case of the long tendons of the foot of many birds, which, although consisting of white fibrous tissue in the young bird, become converted into true bone in the aged. Again, the bones constituting the vault of the human skull are not developed through the medium of a cartilaginous matrix, but have their origin in a fibrous membrane. I do not wish to adduce instances of bony formations dependent upon pathological changes; these, although very numerous and striking, only testify that such changes may take place in tissues consequent upon irritation and disease; it is the physiological or healthy function of tissues which now engages our attention, and not the abnormal change these tissues may undergo consequent upon some morbid condition.

Experiments have been made in reference to this subject upon rabbits of various ages and under different sanitary conditions, and, as we might expect, the most satisfactory results have been obtained when the animal operated upon was young and placed under circumstances favorable to health. The question for solution is, what is the function of the periosteum in reference to the generation of bone, and is it the formative organ. The following experiments afford a satisfactory solution to the question: a portion of periosteum was detached from the tibia of a living rabbit, one end remaining adherent to the bone, the other end being securely attached by means of ligature to the internal surface of the skin; the wound being closed, union of the divided integument was speedily accomplished. Three or four days after the operation the periosteum became perceptible to the touch, had increased in size and firmness, becoming daily more and more distinct; seven weeks after the operation, having killed the animal, the detached portion of periosteum was found to have developed a piece of bone—in form corresponding to the position in which the periosteum had been placed—that is to say, somewhat circular. When a precisely similar operation was performed upon an old rabbit, (five years old) no such results were obtained; but, on the other hand the wound suppurated, a serous pus or rather a pus resembling tubercular matter was effused, without the slightest discoverable attempt towards the formation of bone. We may therefore infer that the osteo-genetic power diminishes with age—and also that any form may be given to the bone by simply placing the detached periosteum in the position we desire the future bone to assume.

In another experiment the rabbit operated upon was eight months old, the periosteum was detached as in the former experiment, but was coiled around the bone, and its detached extremity kept in position by means of a ligature. Four days after the operation the wound was re-opened and that portion of the periosteum which had been left attached to the bone was now severed from it. At the end of twenty-three days, the periosteum had become wholly converted into bony matter.

In a subsequent experiment a portion of periosteum from the tibia was dissected off, and placed beneath the skin of the back; thirteen days afterwards, complete ossification had taken place.

The bones thus obtained have all the characteristics of normal bone. Examined microscopically, they exhibit the lacunæ and canaliculi, and the Haversian canals are disposed in the direction of the axis of the bone.

These experiments prove to demonstration that cartilage is not absolutely necessary for the formation of bone, and are strongly corroborative of the opinion set forth by Sharpey, that the shaft of the bone increases in diameter by the direct ossification of the sub-periosteal layer. An examination of this layer by the microscope reveals the presence of a blastema composed of cells and free nuclei, such as are to be met with in embryonic tissues, together with some exceedingly fine fibres.

When the periosteum is transplanted this subperiosteal layer is the germ whence bony tissue is developed.

In proof of this assertion it has been found experimentally that if the inner surface of a detached piece of periosteum be scraped with a scalpel and the sub-periosteal layer of nuclei, nucleated cells and accompanying fine fibres be thus removed, the osteogenetic power of the membrane is thereby wholly destroyed.

It may be asked whether bone thus developed continues to grow indefinitely. To be able to satisfactorily answer this question would require the experience of several years; but, reasoning from analogy, it may be presumed that these heterotopical bones would continue to increase in size so long as the normal osseous framework is augmenting in volume.

From a surgical point of view the importance of the knowledge obtained by means of these experiments is very great, and must have an important bearing upon resections and rhinoplastic operations. It suffices, however, for our purpose to allude merely to this subject.

The periosteum, therefore, by virtue of its deep layer is most conclusively shown by these experiments to generate bone, and it is by virtue of this property that bone normally increases in diameter; its increase in length being provided for by means to which we shall presently refer.

Paul Broca speaking of these experiments says, "Ollier, with great ingenuity, has revived a subject, in regard to which it was thought that nothing remained to be discovered, and it has yielded a rich harvest of entirely new facts; the discoveries which he has made with reference to the functions of the periosteum, may be numbered among the most important of our age. The idea of transplanting portions of this membrane, of burying them in the midst of the fleshy tissues, of grafting them in positions distant from the skeleton, of transferring them even from one animal to another,—this idea is peculiarly his own, and, thanks to him, we now know that the periosteum does not require, for the production of bone, to be in contact with osseous tissue. This membrane carries with it wherever it may be placed among living tissues its special osteoplastic power, its inherent property. The fact had long been suspected, yet not positively known, and to Ollier belongs the merit of having demonstrated the truth in a manner both rigorous and striking."

We conclude that the periosteum is composed of two essentially distinct portions having wholly different properties—that the external or fibrous layer is the medium of connection between the tendons of muscles and the bony levers to which these muscles give motion, and moreover, serves as a basis of support for the capillary bloodvessels which go to the nutrition of the bony tissue; that immediately beneath this fibrous envelope there exists a cellular layer having osteogenetic or bone producing power; that this layer may be transplanted to a distance from its original site, and while among the living tissues of the animal is capable of producing perfect bony tissue, that is possessed of Haversian canals, lacunæ and their accompanying canaliculi; and that it is by virtue of this layer that bone increases in diameter. It is also manifest that a continuation of this periosteum is to be met with in the densest structure of bone lining these canals lacunæ and canaliculi; for, as heretofore remarked, if we submit a thin section of bone to the prolonged action of heat, all trace of the acunæ and canaliculi disappears, due to the fact that the organic matter lining these lacunæ and canaliculi has been dissipated by the heat to which the section of bone has been subjected; while, on the other hand, if a similar section of bone be submitted to the continued action of an acid, which shall dissolve the earthy matter of the bone, we find upon microscopical examination that the lacunæ and canaliculi are still plainly visible, the organic matter which lined these spaces not having been dissolved by the acid. In the long bone of an adult, such as this femur, there exist a large central canal containing a substance called marrow. It has been universally held up to the present time that this canal is lined by a membrane continuous (by means of processes traversing the substance of the bone) with the external periosteum, this membrane is said also to be fibrous or of precisely the same character as the external membrane, and by way of distinction it is spoken of as the endosteum and sometimes as the medullary membrane. Ollier, however, has called attention to the fact that the very existence of this membrane is due solely to an effort of the imagination, that in fact no such membrane exists. So startling a statement on the part of Ollier, one so contrary to all that we had hitherto learned from what were deemed reliable sources, Duhamel, Troja, Flourens, Carpenter, Todd and Bowman, of necessity required verification or negation. I have made such enquiry and now submit to you a fresh bone from the ox, in which it is manifest that no endosteum or medullary membrane can be shown to exist. It is as important to remove error as to set forth truth, the former is usually the more difficult task, and no doubt our text books will continue for many years to speak of the endosteum, its nervous supply, &c., &c.

The marrow or medulla of the shaft or diaphysis is found therefore in this medullary canal unsupported by any investing membrane, but frequently preserving the form of the canal in which it lies as in a mould.

Marrow consists essentially of cells and nuclei, with blood vessels and a few fibres of areolar tissue, together with fat in variable quantity. Marrow varies in appearance and structure according to the age of the individual, being red in early life, and whitish or pale in the adult. In old age the marrow consists largely of fat. It varies in quantity in an inverse ratio to the thickness of the surrounding bone, and takes the place of the osseous tissue removed by absorption.

It may therefore be looked upon as the last stage in the process of bony development. Bones at the earliest period of ossification have no medullary canal; but, as condensation of the osseous tissue takes place, so the medullary canal becomes apparent. Marrow is thus a secondary product in the evolution of osseous tissue.

The account given of marrow by the authors of works upon physiology is generally exceedingly brief and sometimes altogether wanting.

By Havers it was held that marrow serves to preserve the temperature of bones—that it lubricates the articular extremities, &c., &c.; of late, however, some have maintained that it possesses osteogenetic power; but the glance we have given to its anatomy favours no such idea, and numerous experiments fully establish the fact that marrow does not develop bone unless under peculiar pathological conditions, and even then the ossific matter is due either to the fibrous element of the areolar tissue which enters to a very limited extent into its composition, or is derived by a process of growth from the bony walls of the medullary canal.

The bones of birds have their canals filled with air, in order to diminish the weight of the body, and in other animals these same canals are filled with a substance whose specific gravity is less than that of any other organized tissue. When, for the purpose of experiment, we fracture the long bone of a bird, marrow is formed in its interior, subsequently osseous union by growth, from the internal surface of the bone, takes place, and after a time absorption of the medulla above the point of fracture, finally, after a prolonged period absorption of the medulla below the seat of fracture, and the bone is thus restored to its original condition.

Having thus learnt that the increase of the diameter of a long bone is dependent upon the osteogenetic power of the sub-periosteal layer, we have now to enquire by what means a bone increases in length. It might be supposed that this could be effected by interstitial growth, but further experiments prove conclusively that bone increases in length by addition to its extremities, and that the shaft or diaphysis once ossified increases in diameter only, without any corresponding growth in the direction of the axis.

Before entering upon the consideration of this portion of our subject, permit me to give a very general account of cartilage. Cartilage or gristle is the term applied to two structures which, in composition, are very widely different, and it is to be regretted that distinctive names should not have been assigned to each. The simplest form of cartilage, spoken of as permanent cartilage, is met with in the external ear, the nose and the eyelids, &c. It is remarkable for flexibility and preservation of form. This property of permanent cartilage admirably adapts it for maintaining the identity of the features of the individual throughout life. In ultimate structure it is one of the most simple of the living tissues. A slight modification of this form of cartilage is applied to the investment of the extremities of the long bones, and also for the covering of those portions of bones which, in other situations than the joints, are subject to attrition, thus the tendons of many muscles play in bony grooves, such grooves being lined with this form of articular cartilage. These forms of cartilage are spoken of as permanent cartilage and are not prone to ossify, their ossification when it does take place being due to pathological change, and not to the development of a physiological property. But, under the name of temporary cartilage, we have to make ourselves acquainted with a tissue whose intimate structure is widely different from that of which we have just spoken, and whose physiological function is to serve as a nidus for the development of bone. It differs from permanent cartilage, inasmuch as the cells which enter into its composition are not irregularly dispersed through the surrounding fibrous tissue, but are so disposed as to assume a linear direction, corresponding with the axis of the bone undergoing development. Moreover, the fibres constituting the fibrous tissue have a similar direction. We have already seen, that white fibrous tissue is especially prone to ossification, as exemplified in the case of the tendons of the legs of many birds. The fibrous tissue of the cartilage is the especial seat of ossification, the cells leaving interspaces constituting the cancellated structure of bone.

The axial extremities of bones being covered with cartilage, and the fibrous element of this cartilage being the seat of the osteogenetic power, it is manifest that the increase in the length of a bone is effected by addition to its extremities.

Another question, however, arises as to whether a long bone increases in length equally at both extremities. John Hunter, Duhamel and Flourens, had previously made numerous experiments in reference to this subject; more lately Ollier has devoted himself to the enquiry. Without entering into all the details of his experiments, made upon rabbits, it will suffice to say that in the case of the humerus the increased length was almost wholly in favour of the superior extremity, being in the ratio of seven to one. As regards the radius and ulna, the very reverse was found to be the case: the bones had increased in length 10 millimetres at the superior extremity, and 27 millimetres in the direction of the carpal articulation. In the case of the bones of the lower limbs, the increase in length of the femur was observed to have taken place principally at the lower extremity; thus the latter had gained 17 millimetres, while the superior had gained but 6 millimetres. An inverse condition was found also to exist in regard to the tibia; the inferior extremity being less augmented than the superior.

These facts are of great practical importance from a surgical point of view, leading us to infer that resection of the head of the humerus, in the case of a growing child, will be attended with a considerable arrest of development and consequent shortening of the limb, and that a similar result will follow from the resection of the inferior extremities of the radius and ulna. As regards the bones of the lower limb, the contrary rule would hold good.

THEODORE II. AND THE NEW EMPIRE OF ABYSSINIA.

(*Translated from the Revue des deux Mondes, Nov.,* 1864.)

(*Continued from page* 156.)

About this time an English missionary arrived at the court of Theodore, and his name has a great notoriety in a certain religious circle. This was the Rev. Mr. Stern known by a famous voyage in Yamen, and by an excellent work on Abyssinia: "A Mission amongst the Falashes." The Emperor received him coldly at first, and said: "I am tired of your bibles!" He obtained permission to return to Massanna, and he committed the imprudence of not availing himself of it at once, so that on his presenting a second demand in Oct., 1863, the Negus said severely: "You have gravely offended me in not using the permission I gave you. As you are a stranger, I pardon you; but those of my subjects who could and ought to have enlightened you will be punished.' The two confidential servants of Mr. Stern were beaten so cruelly that one died the next night, and the other some days afterwards. Mr. Stern had been necessarily a silent witness of this savage scene, and had involuntarily bitten the thumb of his irritated hand. This gesture signifies anger in the mimicry of the Abyssinians, Theodore saw it and was so little affected by it that when Mr. Stern returned home he sent him, as usual, his supper from the imperial table, but the courtiers did not allow the missionary to escape so easily; they demanded the punishment of the audacious stranger who had threatened his majesty, after having first alleged that Mr. Stern meant nothing by his gesture, yielding probably to the false shame of appearing to shrink from ill treating an English subject. Mr. Stern was summoned, brutally laid flat upon his face, and beaten less severely than his unhappy servants, indeed, but to such a degree that he was confined to his bed for a long time. A domiciliary visit, paid, in consequence of these deeds, to the houses of the English Bible Societies, led to the discovery of many letters and notes, written in German and in English, and relating to the late events in Abyssinia. Theodore had them translated; and these notes, written, without any object, by people desirous of preserving a rememberance of what had happened before their eyes, provoked him to a terrible rage.

He arrested three of the most prominent of the accused: the soldiers, not knowing them, deemed it proper to put in irons all of the Europeans connected with the missions of Djenda and Darna, amongst whom were two young women, Mmes. Flad and Rosenthal. The Negus questioned the former alone, hoping to obtain from her a confession by intimidation. She answered him simply "that it was the custom of the Franks to take notice of everything which interested them in their travels." Not being able to derive any further information, Theodore released the two ladies and M. Flad, and, to give the appearance of impartiality, he assembled at Gondar, as in a kind of superior court, all the Europeans in Abyssinia. MM. Stern and Rosenthal were cited before it as the greatest discoveries had been made at their houses. The points of accusation were read, and the Negus demanded of the jurymen what punishment the laws of Europe inflicted on men who spoke thus of the sovereign. "Death, answered the president of this commission, without hesitation; but we invoke the clemency of your majesty in favour of strangers who are guilty more by misunderstanding than by intention." This apparent abandonment of the accused was in the opinion of those who were acquainted with the Negus, much more skilful than a speech, which would only have irritated him, and have ruined at the same time the accused, the lawyers and the judges. "I will be merciful," said Theodore, "I commute the punishment which you have pronounced to that of irons for MM. Stern and Rosenthal." Turning to the latter, he said: "How have you been so rash as to judge a prince you do not know and facts which you have learned only by hearsay?" This was logical; but M. Rosenthal might have objected that there was only crime where there was publicity. "You are ignorant perhaps," added the Negus, "that the law of the empire offers you a recourse of which I would like to see you take advantage like a courageous man. You have the right to say of me whatever evil you please, provided you are ready to maintain your words, on horseback with your sword in hand, against one of my champions." We may easily imagine how this proposition was received by M. Rosenthal, who had never handled anything but the spiritual arms of theology.

What had most deeply wounded Theodore II., in the papers that were seized, was not the recital of the useless barbarities committed during two years, but the fact,—public, however, and known by the Abyssinians—that he was the son of a merchant of *Konsso.* "Who has revealed it to these strangers?" he asked with feigned simplicity, "Doubtless some person of Gondar, a city of priests, who do not love me. On to Gondar!" He laid upon the unfortunate city, already exhausted by the three months sojourn of the army, an enormous tax which was immediately paid. Next day he demanded twice as much, and as the inhabitants could not comply with the request sufficiently soon, he sent his troops against the town, with orders to *eat* it, that is, to pillage it at pleasure. Nothing was respected, not even the churches; the old capital of the Neguses was reduced so as to envy the most wretched villages. The Mussulman quarter, Islambiet, the centre of the commerce of Upper Abyssinia, and as yet free from all the revolutions, was sacked and almost destroyed, some time after, an arbitrary act, the cause of which has not yet been well explained, added to the sorrow of the Europeans who were residing in Abyssinia. The English consul, Mr. Cameron, was put in irons. This violation of the right of nations, has given rise to more or less romantic versions which the journals of Europe have received and which show in some degree the talkative and jesting spirit of Alexandria, where they had their source.

The most reasonable explanation is this. Mr. Cameron, on leaving Abyssinia in Nov. 1863, had taken with him an agent which the Negus had attached to him, undoubtedly as a spy. The consul had dismissed him after crossing the frontiers, and this act had deeply offended Theodore. Moreover, he made a long excursion into the cotton districts of Sennâo and Gallabat, in order to study them with a view to the political and commercial interests of England. Theodore II., who did not understand that a diplomatic agent could be interested in commercial matters, supposed that Mr. Cameron had gone to make arrangements with his mortal enemies the Egyptians, and assailed him in consequence. Lastly, he had been offended at receiving from the *foreign office*, a letter signed by Lord Russell and not by the Queen herself, "I wrote to Victoria," he said humourously, "and not to this Mr. Russell, whom I do not know." This was probably only a pretext, for in January he had received with joy a letter from the French government, signed by M. Thouvenel; it is true that in delivering this letter to Theodore II. I had hastened to declare that M. Thouvenel was the *afa-Negus*, (1 Literally, *mouth of the Emperor*, orator of the crown. It was formerly the first office of the court. Theodore II. suppressed it as being a sinecure) of Napoleon III. However it may be, Mr. Cameron was enchained, shut up, and guarded night and day in a tent near the quarter general on the banks of the river Kaha. It does not appear that during the last ten months this frightful situation has had an end. His servants and his clerks have shared his fate. Among them was a young Irishman, 18 years old, who, after having led for some months a perilous life, hunting elephants in Nubia, had been seized with an irresistible desire of seeing Abyssinia and its sovereign, knowing that the Negus loved scenes of war and of the chase, he brought as a present for him a very fine carpet on which was represented the well known scene of the Spahi Jules Jenard chasing the lion; he had shewn it to me at Adona with satisfaction, and expected wonders from it. He arrived just at the time Mr. Cameron was arrested, but was not any less well received. The hunter presented his carpet. "How impertinent these English are!" said Theodore to his officers. "Here is one who foretells by a picture that the Turks will slay me! Do you not see this man with a *tarbouch*, (1) this Turk who fires at a lion? Who is the lion of Ethiopia, if it be not I? While the Turks kill me, put this Englishman in irons!" The poor youth asked with surprise: "What have I done?" "You have done nothing," said the Negus who was softened; "but as I have put your consul in chains, you cannot love me, *and he who does not love me must not be free.*" Two months afterwards, Mr. Cameron received another companion; it was the favorite, he, having been absent at the time of the arrest, had yielded to a good feeling by going the next morning to the audience of the Negus and asking him, in the name of his honour as a civilized sovereign, to set Mr. Cameron and his friends at liberty. Unfortunately he spoke the Amharic language very badly, and it appears that in his confusion he substituted a word of command for a term of advice or prayer. "Do you hear this *ass*," said Theodore, "who pretends to dictate to me his orders? since he has so much interest in the consul, chain him with him!"

While the relations of the Negus with the Europeans were becoming more and more delicate, the condition of the empire continually grew worse. The senseless and numberless acts of severity on the part of Theodore produced of necessity anarchy and rebellion. Motionless at Gondar, the Abyssinian emperor saw increasing around him insurrections the extent of which threatened to crush him. In Tigré was Kassa Goldja, the son of that Goldja whom the people of Adona had killed in 1860, as we have already mentioned.

He had no political standard, but a *vendetta* to execute upon the people of Adona, to avenge the death of his father, which is a sacred obligation in the East; he held the country from Takagge to Mareb, and had attempted a bold attack on Adona. He had been beaten, but the inhabitants had lost in the action two of their chief generals, a son of the English Coffin, an ancient prince of Antitcho and Koleb, the goldsmith of the crown, and the richest citizen of Adona. Goldja remained strong enough to disturb all Lower Tigré until the end of 1863. Of more importance was the rebel chief of Kolla-Voggara, Terso Gobhesié, whose bands infested the country within two halting places of Gondar. Terso received as soldiers only those who proved, by showing their hands torn with stones and thorns, that they were men to suffer want and continue to the last extremity the life of insurgents, under the ban of the law, and tracked to the depths of ravines and caves. The merchants, however, praised loudly the generosity of Terso, and his conduct towards the caravans which contrasted with the arbitrary seizures of the emperor Theodore. "The Negus is very strong this chief used to say, and perhaps God reserves victory for him; if that happens and if we must perish let us leave, at least, the name of honest men, free from every theft." Thus he rose rapidly in public opinion whilst the popularity of the Negus hourly waned. This unpopularity, which he felt very much, rendered him still more harsh and violent.

---

(1) Gerard the hunter was in the uniform of a *Spahi* and had his head covered with a *turban.*

A woman came to complain of excesses committed by the soldiers; he told her with ironical abruptness: "I care nothing for such trifles, you had better complain to God." "He is too far away to hear me," replied the woman, "he is at Godjam," that is to say with the rebel Tedla-Gualu. This man had shaken off since the campaign of Feb. 1863, the involuntary terror with which the Negus had inspired him until then, and sent to him ironical and provoking messages which exasperated him to frenzy. From this violent and tragical condition originated a measure foreseen long before, and one of the most deplorable of the reign. By a decree of April, 1864, Theodore II. proscribed Islamism throughout the whole extent of his empire, and declared all the Mussulmans rebels who did not apostatize by eating meats called impure by the Koran. This measure was so much in accordance with Theodore's policy that we are surprised at its not being passed before. Yet this act, even laying aside the question of toleration, was extremely impolitic and unjust. The Mussulmans in Abyssinia occupied the same inferior condition as the Christians of the East do in the Mussulmanish states. Strangers for centuries to the use of arms, they had taken no share in the troubles of the empire, and were satisfied to enrich themselves by commerce which they had partly monopolized. Therefore, almost all the towns of Abyssinia were Mussulmanish, either wholly as Derita, Empras, Haussa, or partially as Gondar or Mahdeva-Mairam. The private character of the Mussulmans was in general superior to that of the Christian population. They could be reproached only with the trade of slaves, which is perhaps the basis of Islamism. If the Negus had the right of punishing those convicted of trading in slaves, he had not that of proscribing entirely a religion. Besides, by his injurious repeal of the laws against this trade, he had shown himself the first upholder of this social crime.

However this may be, the decree met with no armed resistance anywhere, as the Mussulmans did not think for a moment of the possibility of such a struggle. The greater part submitted as at Gondar; others (the people of Derita for example) left their homes and their little fortunes painfully gained, and took refuge in the woods. I knew at Massaona a good Mussulman of Gondar, called Adem-Kourman, whom I saw last July a prey to sorrow which was explained to me. He had left at Gondar considerable property and a very pretty wife whom he loved very much. Theodore, seeing that he persisted in not returning to Abyssinia, found amusement in punishing this exile by confiscating his property and seizing his wife. What seemed to grieve the unhappy Kourman was, not that his wife had passed into the hands of the emperor, but that he had converted and baptized her..

III.

The events which I have just related have sufficiently shown the character of Theodore, so that at the end of this history I need not dwell long upon his physical and moral character. The man on whose head rests to-day the fate of Abyssinia is 46 years old. He is of medium size, has an imposing carriage, with an open and sympathetic countenance. His features, less regular than those of most Abyssinias, are expressive and moving, and have nothing of that borrowed dignity which marks some oriental faces with the stamp of solemn insignificance. His look is lively and piercing; the fixed lines of the profile express well the firm will which has subjected to his yoke the freest and the least docile people of the East. Rigorous towards others in point of etiquette, the Negus violates it in his dress, and affects an air of negligence which, however, never amounts to bad taste. The simple cloak of a soldier, a pair of trowsers and a sash in which are his pistols and an English sabre, and over all a *chama* or embroidered toga form his usual attire. Europeans, on being presented to him, show sometimes hesitation in distinguishing him in the crowd of silk doublets (*balakamis*) which surround him, and commit mistakes which amuse him very much. This disdain for all luxurious studied elegance rules all his acts: the furniture of his tent is of the most simple character, while his residences at Magdola and Devra-Tabor are filled with silks and the cloths of France and India. Engaged in a campaign, he carries the black and coarse shield of the foot soldier, while a page bears at his side the state shield, which is covered with blue velvet and strewed with imperial fleurs-de-lis.

What strikes one most in Theodore, is a happy union of suppleness and force, especially the latter. Naturally haughty, violent, and addicted to pleasure, he rules his passions in this respect, that they never cause him to go beyond the bounds he has formed. He has been unjustly charged with drunkenness, and I have received on this point information which I had reason to believe more true. He is temperate, eats little, and never drinks to an excess, still less to a brutal state of intoxication, more worthy of a Jolof or Mandingo king than of a sovereign of Christian Abyssinia. As for women they have never had the least influence over his public life. I except, however, his first wife, the good and regretted Tzoobedji, for whom he had a sort of worship. She was, besides, the faithful companion of his days of suffering, and when he lost her, seven or eight years ago, he saw in this death a punishment which heaven inflicted on him for having burnt a woman alive at Godjam. Tzoobedji had kept him in the simple life and in the pious customs of an Abyssinian of ancient times, and when she died, he lived 18 months in the most strict continence.

An ambitious marriage has been the indirect cause of the dsiorders which have since arisen. To settle the claims of the house of Oubie, he married, about six years ago, the daughter of Oubie, the young and beautiful Toroneche, who had, throughout all Abyssinia, the name of an accomplished princess. Witty, educated, and charming, she had scarcely any defect, but an obstinate pride, which is a failing common enough among the Abyssinians of a certain rank. For two or three years the most perfect concord prevailed in their home. Theodore had for his charming companion a tenderness mingled with a large amount of pride, and when she presented him with a son, he assembled all the grandees in a theatrical fête, where he showed them the new-born, and said: "Here is he who will rule over you!" It is doubtful whether the persons present took this remark in earnest, against which the elder sons of the Negus might justly have protested. One day at the feast of Easter, the princess asked her husband for the pardon of some chiefs of Tigré, who had been kept in irons for their attachment to Oubié. This proper request excited the suspicions of the Negus to the highest pitch.

"Do you say," he replied, "that you prefer your father to me?" "Perhaps so," answered the proud princess. She had scarcely spoken when she received a violent blow upon her cheek. Bell, who wished to interfere, received another. Oubie, who, since the marriage, had regained favour, was put in irons, and has not yet recovered his liberty. Moreover the Negus, to sting his wife to the quick, took immediately four favorites from the lowest ranks. This first freak having passed, he dismissed them all, except one, a woman of Jedjo-Gallas, who has none of the physical or moral charms of Toroneche, but who skilfully retains her capricious lover by many cares and attentions which the haughty Toroneche was so imprudent as to despise. What shows clearly the debasement of the national character is, that the people who surrounded the Negus have sided with him in this scandalous act. The church alone protests by the voice of some bold priests. At Easter, Theodore II., obliged, for the sake of decorum, to receive the sacrament, obtains absolution only on condition of changing his conduct. He then goes and sees the *iteghe,* who still has some influence over him, for he is proud, in spite of his faithlessness, of being the husband of a woman so much admired. He passes an hour listening to the most biting and harsh truths, and if sometimes he becomes angry and threatens, the iteghe coolly reminds him that a negus has never killed his wife, and that she is well assured that he will not begin.

Theodore then returned somewhat ashamed to his little court, makes a public confession, declares "that he is the most scandalous sinner in Ethiopia, that he is so in spite of himself, that it is a victory of the demon, a victory which should make us all feel our weakness and our nothingness." Finally he promises that he will try to do better, and dismiss the favorite. Easter over, he retakes her, and adds sometimes another.

In these faults, eveyrthing with the Negus is destined for effect. He is theatrical, *fakereo*, as the Abyssians say; the shade of meaning is rendered in the great Latin comedy by *gloriosus.* No one has more than he the attitude, the gesture, the voice of royalty which commands; he presides admirably over an assembly, and his eloquence, lively and colored, rarely fails in its object. With an assumed contempt for literary men, whom he calls *azmari* (stage players), he is himself one of the first order; he has cultivated very much the Amharic, the common language of Abyssinia (1), and competent judges have assured me that his letters are models in this language. He likes to write; his letters, of a mystical form and often obscure, are master-pieces of African diplomacy. In them it is very necessary, as it is said, to read between the lines.

The name of Cromwell has often occurred to my mind when hearing the Negus speak or when reading his letters. He recalls the famous protector by the theological pathos in which he envelopes the inspirations of his mysterious policy. He evidently retains, without his knowledge, the impressions of his early scholastic and monachal education. With him, the theologian has dictated to the sovereign impolitic acts and useless deeds of severity, as the affair of Azago at the beginning of his reign. I have said that Azago was a little town of theological merchants, who held upon the nature of Christ a very subtle opinion slightly affected with heterodoxy. The upper commerce of Gondar belonged to this sect, whose ideas, little dangerous to the state, offended the Negus. He assembled at Gondar a council, over which he presided, and where the dissenters argued warmly against the ignorant *Aborina* and his orthodox courtiers. Theodore resumed the discussion, and asked the people of Azago: "Do you recognize the *Aborina*, yes or no, as your regularly appointed head?" "Yes," answered they without hesitation. "In that case, my children," replied the Negus, "you are seditious persons if you think otherwise than the *Aborina*, the regular head of the church, and I, the temporal protector of the same church. Go, therefore, and abjure your error, or else the executioner will cut off your heads on this very spot." In fact, the executioner of the state was there, armed with his heavy sword. The dissidents, out of countenance, observed that some time was requisite for such an action, and requested three days for reflection. Theodore granted them, dismissed the assembly, and had them confined in the council chamber without provisions and without water. I have not heard that any one of them waited until the evening of the second day to abjure. It is said, and I easily believe that they abjured only with their lips. There is in the mountains near Gondar a half savage race, but timid and inoffensive, the last remains of a population which probably preceded the present Abyssinians in the possession of the soil. The Kamantes, (this is the name of the tribe) practice, under the shelter of their forests, a mysterious paganism, and have no other employment but that of supplying the capital with the needful amount of firewood. Theodore thought once of having them baptised by force and en masse; but a courtier, to whom he communicated this idea. judiciously observed to him: "that whenever the Kamantes became Christians, they would be the equals of the other Abyssinians, and would disdain to bring any longer their fagots to the city, so that Gondar would be no longer inhabitable" This worldly prudence saved these poor people from an unprovoked persecution. About three years ago, the French government demanded, by the voice of its Consul, the free preaching of the Roman Catholic religion in his empire. Theodore answered by a curious letter, the meaning of which is as follows: "It is truly scandalous for Christianity that it should be divided into five or six hostile communities, whilst Islamism presents a well disciplined body. Why should not an occumenical council be held to draw up a doctrine which all the Christian world should be bound to adopt? The pontiffs holding the five equal patriarchates of Christianity, Alexandria, Antioch, Rome, Constantinople and Jerusalem, would settle without dispute the question of knowing whether the church ought to have a head, and if this head should be at Rome or somewhere else. I am ready to submit to the decrees of such a council; but until it is convoked, I will remain in my ancient faith, which is that of my fathers, and I will not allow any other to be preached, for there ought not to be two religions in a well governed state." Faithful to this programme, Theodore permits no attack against the official church, whether it comes from the Protestants or from the Catholics. While showing his obedience to the national church, Theodore considers himself bound in no respects to a clergy whose influence hinders his policy, and whose head, *Aborina* Salama, is an incorrigible and notorious conspirator. Salama, during the six first years of his pontificate, treated the Abyssinian princes with the arrogance of an upstart who feels himself supported by the masses. It was reported to him one day that the *iteghe* Menena, in a humorous moment, had called him a slave, in allusion to the sum paid to the patriarch of Alexandria for his nomination. "Yes," said Salama, "I am a slave, but a valuable slave, since I paid 7,000 talaris. If the *iteghe* were exposed for sale in the market of Metamma she would not bring 12 talaris." With Theodore affairs took a different turn very quickly, as the following anecdote proves which has too much of the Abyssinian character for me to substitute my recital for that of the narrator, a simple *bacha* (captain) of the guard.

---

(1) The language of books is especially the *ghif,* a dead one which the clergy and lawyers speak and write. It is the Latin of Abyssinia.

One Sunday morning I was summoned to the presence of the Negus, about six o'clock. I went trembling, for it was a bad sign to be called to him so early. His majesty said to me: "Bacha George, go and find the *Aborina*; call him an ass, call him a dog. Go!" I bent my head to the ground, and replied: "Sire, I am ready to obey; but deign to consider that I am merely a captain, and that your sacred words will have more power through the mouth of a *ras* (1) (colonel).

"You are right," said the Negus gracefully to me, and he summoned the colonel on duty. I know Salama, and I do not doubt that he answered with a strange, deep tone to this message. Such a state of affairs could not but have a bad issue for one of these two cunning, circumspect, and irreconcileable enemies. Not three years ago the *aborina* was confined some time at Magdala, and the strictness of his imprisonment has only been partially concealed by the outward attentions which are bestowed upon him. The Negus is an educated man in an Abyssinian point of view, that is to say, he is versed in national history and theology, while he is very well acquainted with the contemporary state of Europe. He appears to esteem our civilization very highly in the material point of view, whilst in the moral he placed it low enough. These prejudices will be easily explained when we consider that five-sixths of the Europeans whom the love of travelling or the desire of making their fortunes, attracted into Abyssinia, have left behind them remembrances little calculated to cause the name of Frank to be either loved or honored. The trouble of Tigre, by rendering the name of Abyssinia more familiar to our ears, had drawn into this country a large number of adventurers, engineers, founders, drill officers, with problematical certificates. I knew one who, having made large advances of guns to Negousié, had the audacity, after the death of the pretender, to go and present to the victor the account of the manufacturing expenses. Theodore laughingly gave 1000 talaris to this man and sent him away. Now such an action would have very different consequeuces. It is not astonishing that, with such ideas, the Negus should be little inclined to favour the temporary emigration of his subjects either to Europe, or to the Mussulmanish countries. He finds it advantageous to strengthen among his people the proud idea that Abyssinia is the centre and the jewel of the earth, but he knows perfectly well where to stop. If he does not dare to prevent the faithful Amharas from making the pilgrimage to Jerusalem, he does what he can to bring it into disfavour, and when they return he likes to question them publicly upon the beauties of the Holy Land, as compared with Abyssinia. The pilgrims quickly declare that the land of Israel is arid, bare, naked, and accursed, with a large marsh, salt and leady, and a river in comparison with which the Takazze would be a sea. Theodore then turns to the audience: "If it be so," says he, "with the Holy Land, with the soil which God himself chose for his people, what must be the other countries of the west? Let us thank God, my friends, for being born in this terrestrial paradise called Abyssinia.

---

(1) *Ras*, a civil title, means constable, and in the military hierarchy is translated colonel.

The personal courage of the negus has never been called in question; he is only too ready to expose himself in a battle, and in one of those brilliant duels where his superiority as a soldier has always gained him the victory. Without speaking of those I have mentioned, he has had more recent ones, that, for example, in which he killed with a ball in his forehead, the best general of Tedla-Gualu, 4 years ago. He presents a magnificent appearance at the head of a squadron and at full gallop, when intoxicated by the movement and by the smoke, he utters, with a full and quick voice, his battle-cry: *Abba Langhia.* His talents as a general and a strategist are more disputable. The campaign of Godjam, of which I was a witness, was so desultory and so pitiful that I have felt like inquiring if Theodore did not make the war last by calculation. His tactics, mysterious and sinister, are well calculated to strike the imagination. Then, after some days repose, the army receives orders to be in readiness to march the next day in a given direction, to the south for example. Two hours aferwards, at sunset, the negus mounts his horse, impassive and taciturn. Thirty chosen fusileers are grouped around him, five or six sure horsemen follow him five paces behind; he marches to the north or to the east, no one knows where, and is not anxious to be informed. Some days pass without any news, then people hear that Theodore has surprised, after a long forced march, in which he has received reinforcements scattered among the cantonments, a rebellious province, and has massacred many of its inhabitants. At last an imperial proclamation is issued in all the districts. Listen to what Djaw-Hoe says: "I have punished the wicked, I have killed 22,000 men. Peace be unto honest men, and let no one be disturbed!" By a contrast which will be understood by those who have known him intimately, this terrible man loves acts of kindness, adopts orphans, takes care of their future life, gives them in marriage, and never loses sight of them. He adores children, attends to them, and affords them as much amusement as a grand-father; they undoubtedly make him forget the base and treacherous persons who surround him. "Not one of you loves me," he says sometimes to the courtiers who encircle him. "Those who fill my prisons are happier than I, for there are persons who love them and think of them; when I die, not one of you will throw a handful of earth upon my grave." To this the answer might be given, that he has done everything to render himself an object of terror, and has done nothing to gain the affections of his subjects. His systematic mistrust has cast into chains almost all the representatives of the feudality of the empire. This feudality has engendered all the evils which have precipitated Abyssinia into the abyss where she has rolled for more than a century yet, individually, the most of these great vassals were men naturally proud, worthy and estimable. I will mention only two, who still live, Belgada Aræa and *ras* Oubie (who must not be confounded with him of Derestie who was conquered). The latter is a fine old man with a soft and gentle figure, who understands and loves the Europeans. The companion of his long life came to share his chains; the Negus tried to intimidate and separate them by a divorce, but his efforts were in vain. "Your majesty," said the noble woman, "can put us to death; you cannot separate us, for heaven remains to us."

The arrest of Balgada was characteristic. Under the pretext of coming to render homage to the Negus, he had presented himself before him at the head of an army of Tigreens, as if to brave him. Theodore was not a man to be provoked in this way; graciously he received Balgada, invited him to dine with him, took him by the arm to show him the interior of his camp, and at the end of this promenade put him in irons, Balgada became enraged, insulted Theodore, who stood by unmoved at the execution of the order, and demanded of him what crime he had committed. "None," answered the Negus, "I arrest you because Tigré loves you and because you are strong and foolish enough to excite a new revolution." "Give me a horse and a sword," said the exasperated Balgada, "and prove to me with a sword in your hand that you are worthy of the throne!" "God preserve me from that!" replied Theodore without any emotion. "Abyssinia has had brainless paladins enough like you, and they have been her ruin, she needs now a master and order, go, *and may God deliver you!*" This saying was not, as some might think, a bitter jest, it should rather be translated thus: "Pray to God that he may bring about days so peaceful that I may, without endangering the public peace, restore you and similar ones to liberty."

We have led the reader into the very heart of cotemporaneous events. How will we conclude this series of confused struggles which we have endeavoured to relate? It is very certain that for nine years the whole of Abyssinia has been under the sway of one man. Of all the more or less factious rivals of Theodore, not one has been a serious pretender. The strongest, Agan Negnisie, was indecision itself and the plaything of a thousand intrigues. The last of the idle kings, Johannes, who has been the object of the thought of some European politicians, is a man of gentle manners, a literary character, a poet, but a prince without prestige and without a name. The terrible sovereign before whom all Abyssinia trembles speaks to Johannes with submission, calls him *my master,* would not dare to sit before him, but coldly leaves him to die in misery, in the depths of the lonely palace of his ancestors which the ironical generosity of the Negus has left him. There remains Tedla Gualu, of whom the supporters of the insurrection seek to make a great man; he is merely a little skilful prince, who does full justice to himself by avoiding every pretension to the crown, and who only desires to live as a sovereign in his fief of Godjam, without having to pay tribute to any one.

Theodore II. deems it of the greatest importance to perpetuate his dynasty and with it the empire which he has restored. He pretends to have an unshakable confidence in this: is it well founded? however, this is how he reasons: "God has promised the future to the house of David. Of this house, I am the only heir among all the cotemporary sovereigns; the future then belongs to me, or at least to my line. I may succumb, but my line must triumph, for the prophecies cannot be false." He has two adult sons by his first wife. The older is a kind of vulgar caliban, despised and detested by his father, who carefully re-

.ves him from every political transaction. His ferocity would render even a king of Guinea jealous; at the end of some trifling disturbance with the suppression of which he was charged, he sent to his father a basket full of *torn* out eyes. Sometimes he introduced into the ears of the sufferers cartouches to which others set fire to blow out their brains. Given to drink and fond of talk, he used to drink hydromel with some of the superior officers and to speak ill of the Negus to them. The latter being informed, put him under arrest for some time in an ass-stable, saying to him that he would be with his kind. Quite different is the second son, *Dedjaz* Mechecha, a young prince twenty-two years old, who has rendered himself so popular in the government of Dembea, with which he was invested about 1861, that Theodore has thought prudent to recall him. "What means this seeking for popularity?" said he harshly to him. "Do you think of acting like Absalom, of gaining the favour of the people to supplant your father?" The influential men, whom Theodore's unbridled acts of violence terrify, hope much in Mechecha, and undoubtedly, in case of the death of the Negus, the wisest would rally around this brave and sympathetic young man, but will he have his father's iron hand to govern this people? It is, at least, doubtful.

Considering the almost total incapacity of the Abyssinians to govern themselves, good minds, desiring, above all, peace and order, have spoken of foreign intervention. This is too great a step; there are extreme remedies to which we should have recourse only when social order is deeply injured. It was thought also that the English government, out of patience, was preparing to act vigorously against the sovereign of Abyssinia. Information, which there is every reason to believe, permits the assurance on the contrary, that *the foreign office* uses every means to obtain amicably the liberty of its subjects, and carefully avoids everything which might urge the Negus to commit one of those bloody acts of foolishness which unhappily would surprise no one. This prudence is praiseworthy and has the advantage in preparing a desirable solution without involving the future; but, whatever may happen, this question of the future will always engage the attention of the great powers whom the course of events has created arbiters of the destinies of the Christian East. It is an extreme contractedness of ideas which sees the question of the East only upon the Bosphorus or in the Holy Land; it is a question with a thousand faces, positive for some, philosophic for others, imminent for all. It slumbers and threatens to break forth wherever there is involved a great European interest, commercial, human, religious, for every Christian question which enters into the arena of politics becomes of necessity a European one. The Levant has kept for us surprises which have often taken us unawares; this is not the fault of the government, occupied with a thousand different cares; it is that of informers, of diplomatic agents, of missionaries, and of scholars, who have neglected to seek the truth or have more or less innocently concealed it. It is mine also, if I have not succeeded by this study in fully showing an indisputable *fact* and a *conviction* which every one may discuss. This fact is, that the Abyssinian people, in whom the majority of mankind sees a sort of negro race scarcely less ferocious and less brutal than the rest, is a strong, lively and intelligent nation, allied with Europe by physical traits and still more by its strange civilization, which carries us back to the most curious times of the middle ages; it is that Theodore is one of the most remarkable men of this century, a man of genius buried in the midst of barbarism, and whom a fatality, sometimes merited, urges on to an abyss. The conviction which I would like to give to serious minds is, that a people, which has had the energy to preserve in the depths of Africa, and surrounded by the double barbarism of Mussulmans and pagans, so many great and noble things, to begin by Christianity, deserves the effective and restoring protection of Europe.

To remove paltry rivalries, narrow questions of sects, or of pretended acts of legitimacy, to aid Abyssinia in recovering order and unity without despotism, to obtain an energetic government, enlightened and friendly to Europe, to seek within herself the elements of her renovation, following the programme (too long forgotten) of Theodore II. Here is certainly a policy liberal and noble, by no means chimerical and sentimental, with all due deference to those who regret that France saved Greece in 1827. This policy has never been lost sight of by the two representatives of France and England whom chance and their own desire have connected with the cotemporaneous affairs of Abyssinia. I will add that these very misfortunes have in no degree altered their faith in the future of a nation which has not without some secret design of Providence remained alone free and christian in the midst of this degraded and lost Africa. Let me be permitted to say so at least for myself.

GUILLAUME LEJEAN.

ENTOMOLOGICAL SOCIETY OF CANADA.

The annual general meeting of the Society was held in the rooms of the Canadian Institute, on Thursday, February 16th, at 3 o'clock, p.m; the President, Wm. Saunders, Esq., in the chair. The report of the Council for the past year was read and accepted; as were also the reports from the branch societies at Quebec, C. E, and London, C. W.; from all of which it is gratifying to learn that the Society is making very satisfactory progress. The following gentlemen were proposed, and unanimously elected members:—James Bovell, Esq., M.D., Professor of Physiology, Trinity College, Toronto; Rev. W. A. Johnson, Weston, C.W.; John Macoun, Esq., Belleville; Johnson Pettit, Esq., Grimsby; Rev. W. F. Clark, Editor of the *Canada Farmer*, Toronto; C. W. Lloyd, Esq, H. M. 16th Regiment, Toronto; J. E. Orange, Esq., H. M. 16th Regiment, Toronto. Francis Walker, Esq., F.L.S. of the British Museum, London, England, was elected an Honorary member; and Beverley R. Morris, Esq., M.D., London, England (late of Toronto), a corresponding member.

The following donations to the cabinet were announced, and the thanks of the Society ordered to be transmitted to the donors:—From F. Walker, Esq., F.L.S., a very large and valuable collection of European Insects, comprising several thousand specimens, chiefly of the orders Coleoptera, Lepidoptera, and Neuroptera, with a few Hymenoptera. From Rev. F. O. Morris, Nunburnholme, Yorkshire, England, a number of English Lepidoptera. From Mr. Prest, York, England, ditto. From Mr. McLachlan, London, England, a valuable collection of typical forms of Trichoptera, being the British species enumerated in his recent monograph on this order. From Mr. Pettit, Grimsby, 137 specimens of Canadian Insects, chiefly Coleoptera and Lepidoptera. From Mr Saunders, London, C. W. several specimens of the same orders. From Mr. Orange, a few Lepidoptera.

The following works were presented to the Library by the Rev. H P. Hope, Toronto :—Gosse's Romance of Natural History ; Broderip's Zoological Recreations ; Elements of Natural History, vol. 2 ; a copy of the " Carte de Visite " of Mr. H. Ulke, Coleopterist, Washington, D.C. ; and a photograph of a new species of *Alypia* (*A. Langtonii*, Couper) were also announced as having been received from Mr. Wm. Couper, Curator of the Quebec Branch.

The following officers were elected for the year 1865 :—President, Rev. Prof. Hincks, F.L.S. ; Vice-President, William Saunders, Esq. ; Secretary-Treasurer, Rev. C. J. S. Bethune, M. A. ; Curator, Robert V. Rogers, Esq., Jr., B.A. Mr. Harbottle was also requested to assist Mr. Rogers in the duties of the Curatorship during the year.

The standing Committees on the various Insect orders were re-arranged as follows :—On Coleoptera, Prof. Croft, Messrs. B. Billings and Couper. On Lepidoptera, Messrs. Bethune, Reed, Saunders, and Bowles. On Orthoptera and Neuroptera, Prof. Hincks, Dr. Cowdry, Mr. B Billings. On Diptera, Messrs. Rogers, Couper, and Clarke. On Hymenoptera, Messrs. Saunders, Beckett and Bowles. On Insect-architecture, Messrs. Couper, Sangster, Hope, and H. Cowdry.

Mr. Saunders reported, on behalf of the Committee on Canadian silk-producing moths, that during the past year he had succeeded in getting two of the best of our silk-producers (*Attacus cecropia* and *A. polyphemus*) to breed in captivity, and that there is not the slightest difficulty in raising them in any numbers.

Mr. Bethune, on behalf of the Committee on Lepidoptera, presented a list of upwards of three hundred Canadian species not enumerated in the list already published by the Society. He was authorized to proceed with its publication immediately.

Mr. Hope suggested that the Society should send a collection of the more conspicuous Canadian Insects to the Exhibition about to be held in Dublin, in order to afford naturalists at home an opportunity of seeing some of the insect forms of this country. After some discussion, in which the suggestion was approved of, it was decided to defer any action in the matter till it was learnt whether the Government intended to make any grant to meet the expenses of forwarding articles from this country.

The Secretary informed the meeting of what had been done in order to procure German entomological pins for the Society. English ones had been imported in mistake by the merchant to whom the order was entrusted, but measures had been taken to send them back and obtain the desired quality as soon as possible.

Papers were read (1) by Mr. Bethune, on "Some New Species of Canadian

Nocturnal Lepidoptera;" (2) by Mr. Saunders, "Observations and Notes on Insects during the past season."

The meeting also assembled in the evening for the purpose of examining specimens, comparing notes, &c., and adjourned after a couple of hours spent very pleasantly.

THE ENTOMOLOGICAL SOCIETY OF CANADA.

REPORT FOR 1864.

The Council of the Entomological Society of Canada, in presenting their *Second* Annual Report, beg to congratulate the members upon the very satisfactory progress that has already been made by the Society. During the past year, two branches have been formed in conection with it; one at Quebec, C. E; the other at London, C. W., both of which are now in active operation. This is a course that will, we trust, be followed by entomologists in other parts of Canada, and thus a strong society will be formed, which may successfully carry out the study of the insect fauna of Canada. The Quebec Branch now contains *twelve* members, and has already formed a goodly collection of native insects; four papers were read during the year, and meetings were regularly held in the rooms of the Literary and Historical Society; its proceedings are published in the "Canadian Naturalist and Geologist." The London Branch was organized on the 1st of July, 1864, and now numbers *fifteen* members: monthly meetings, at which five papers were read, were held at the houses of members in rotation, and during the season, the mornings of every Monday were devoted to field excursions. The Parent Society, exclusive of the Branches, is now composed of *twenty-one* members; the whole number is, therefore, *forty-eight*, an increase of *twelve* during the year. Three general meetings of the Society have been held, and several field-meetings also, during the summer months. Six papers have been read, and several valuable contributions to the library have been received. The number of donations of specimens of insects to the Cabinet of the Society, is particularly gratifying,—the whole number now amounting to upwards of 2,500. Moreover, in addition to these, a large number of European insects, of various orders, has been brought out for the Society by the Secretary,—the gift chiefly of Francis Walker, Esq., F.L.S., of the British Museum, London,—these have not yet been arranged in the cabinet provided for them by the Canadian Institute, but will ere long be put in their proper places. A list of Canadian Lepidoptera, embracing all the Rhopalocera, and the groups Sphingina and Bombycina of the Heterocera has been published; the remainder is under preparation. The Council, in conclusion, cannot refrain from expressing their regret that the Society has been deprived of the active co-operation of Dr. B. R. Morris, of Toronto, who lately left this country for England. His interest in our proceedings will, we trust, be continued as a corresponding member.

CHARLES J. S. BETHUNE,
Secretary.

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST,—FEBRUARY, 1865.

Latitude—43 *deg.* 39.4 *min. North. Longitude*—5 *h.* 17 *m.* 33 *s. West. Elevation above Lake Ontario*, 108 *feet.*

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resul't. Direction.	Velocity of Wind.					Rain in inches.	Snow in inches.
	6 A.M.	2 P.M.	10 P.M.	Mean.	6 A.M	2 P.M	10 P.M	ME'N		6 A.M	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A. M.	2 P. M.	10 P. M.		6 A.M.	2 P.M.	10 P.M.	Re-sul't.	ME'N		
					°	°	°	°	°												°							
1	29.936	29.941	30.092	30.0052	31.3	33.4	25.2	28.33	+ 4.45	.152	.160	.107	130	.86	.84	.79	.82	W N W	W N W	N	N 25 W	3.0	7.4	9.0	6.28	6.94	...	...
2	30.173	30.152	30.067	30.1233	11.4	22.6	24.1	18.77	— 5.08	.062	.089	.114	.087	.85	.72	.87	.82	N b E	E	E b S	N 82 E	8.0	10.0	10.2	8.11	9.51	...	...
3	29.855	29.661	29.480	29.6445	28.7	31.3	33.8	31.27	+ 7.50	.145	.129	.173	.154	.92	.73	.89	.87	E b S	E b S	E S E	S 82 E	11.0	6.5	4.8	4.80	4.83	0.240	Inp.
4	.332	.434	.512	.4477	34.5	39.2	32.7	34.93	+11.25	.192	.180	.135	.164	.96	.75	.73	.80	E b S	W b N	W b N	N 84 W	0.4	17.0	14.8	13.89	14.59	0.050	...
5	.470	.609	—	—	24.1	19.7	—	—	—	.093	.064	—	—	.72	.61	—	—	W	W N W	N W b W	N 56 W	17.0	21.5	2.0	14.60	15.28	...	Inp.
6	.797	.801	.793	.7965	11.4	19.0	17.9	16.20	— 7.32	.062	.078	.079	.073	.85	.76	.80	.80	N W b N	N W	N N E	N 5 E	7.5	0.8	3.8	2.73	3.33	...	...
7	.750	.635	.436	.5885	16.8	19.4	16.8	17.67	— 5.77	.080	.087	.085	.086	.85	.83	.91	.89	N E b N	N E	N b E	N 23 E	5.0	8.0	10.8	9.73	10.23	...	2.5
8	.199	.171	.232	.1997	17.6	18.3	15.1	16.87	— 6.50	.088	.093	.080	.087	.92	.91	.93	.93	N	N W b N	N W b N	N 37 W	8.2	20.8	20.0	17.26	17.41	...	6.5
9	.346	.421	.484	.4270	11.4	14.7	15.1	14.22	— 9.05	.068	.067	.068	.067	.94	.78	.79	.81	N W b N	N W b N	S W b W	N 66 W	17.0	18.4	8.5	9.77	12.78	...	...
10	.261	.311	.481	.3612	20.5	23.3	21.2	21.80	— 1.47	.093	.082	.099	.090	.85	.65	.86	.78	S W b W	N W b N	W N W	N 60 W	16.0	20.4	13.8	13.03	14.89	...	0.4
11	.705	.721	.649	.6918	6.4	13.2	9.6	9.55	—13.72	.056	.060	.059	.057	.95	.75	.89	.85	N N W	Calm.	N b E	N 21 E	6.0	0.0	9.0	5.19	5.47	...	0.3
12	.772	30.040	—	—	4.6	6.7	—	—	—	.048	.052	—	—	.90	.88	—	—	N b E	N	N N W	N 17 W	16.5	10.0	5.0	8.07	8.29	...	...
13	30.174	30.132	.979	30.0905	−7.0	13.2	9.6	5.35	—17.90	.031	.060	.053	.047	.96	.75	.77	.81	Calm.	S W b W	W b S	S 74 W	0.0	7.0	2.5	2.83	2.93	..	...
14	29.906	29.744	.681	29.7670	1.0	21.2	15.0	13.13	—10.13	.041	.079	.075	.066	.83	.70	.87	.80	Calm.	Calm.	N b W	N 16 W	0.0	0.0	2.0	1.77	1.95	...	.
15	.600	.465	.287	.4302	14.0	21.5	20.1	19.20	— 4.05	.074	.104	098	.094	.91	.89	.92	.90	N b E	E N E	N E	N 56 E	7.5	14.2	10.0	10.32	10.61	...	2.0
16	.217	.253	.353	.2837	19.7	28.0	23.7	24.25	+ 0.88	.103	.117	.118	.116	.97	.76	.93	.89	N E b N	Calm.	Calm.	N 29 E	5.0	0.0	0.0	0.96	0.96	...	0.6
17	.373	.322	.375	.3610	26.2	31.3	28.4	28.73	+ 5.38	.131	.136	.142	.136	.92	.77	.90	.86	N N E	E b N	E N E	N 69 E	4.2	10.8	2.5	5.14	5.32	...	...
18	.468	.466	.552	.5078	27.3	32.7	28.4	29.12	+ 5.68	.118	.165	.148	.142	.79	.88	.95	.87	Calm.	S S W	N W b W	N 78 W	0.0	3.3	13.2	5.22	6.14	...	1.5
19	.683	.748	—	—	16 1	31.3	—	—	—	.074	.129	—	—	.83	.73	—	—	W b N	W b N	N W	N 51 W	1.2	8.0	7.0	7.04	7.42	...	...
20	.972	30.033	30.088	30.0428	17.9	28.0	19.4	21.47	— 2.15	.085	.117	.080	.095	.87	.76	.76	.82	N	N N W	N N W	N 8 W	5 0	2.0	6.5	2.51	2.69	...	...
21	30 161	30.103	29.938	30.0582	24.8	28.0	29.8	27.62	+ 3.88	.112	.124	.147	.126	.84	.81	.88	.83	E b S	E b N	E b N	N 87 E	5.8	12.0	8.8	8.27	8.37	...	...
22	29.773	29.673	.697	29.7157	30.9	39.6	35.3	35.62	+11.80	.149	.194	.189	176	.86	.79	.92	.84	E	S W b S	S W	S 35 W	5.2	7.0	7.8	5.74	7.90	0.085	...
23	.720	.721	.849	.7688	29.8	34.5	21.1	29.35	+ 5.42	.125	.114	.086	.107	.75	.57	.66	.66	S W b W	W	N W b W	N 80 W	0.8	15.5	7.8	9 51	9.86	...	...
24	.952	.972	.974	.9628	14.7	27.3	17.6	20.83	— 3.30	.072	.111	.076	.091	.84	.74	.79	.79	N W b W	S W b S	S S W	S 25 E	0.8	1.4	0 8	0.77	2.02	...	...
25	.916	.748	.366	.6558	18.3	29.8	32.7	27.83	+ 3.50	.087	.133	.172	.134	.87	.80	.92	.86	N E	E b N	E b N	N 78 E	6.5	18.0	18.0	13.11	13.30	0.435	...
26	.082	.207	—	—	36.0	40.7	—	—	—	.206	.196	—	—	.97	77	—	—	E b N	W S W	W b S	S 89 W	2.8	17.0	18.0	10 71	13.93	Inp.	...
27	.984	30.058	30.035	30.0258	20.5	25.9	24.8	23.43	— 1.30	.093	.093	.098	.096	.85	.66	.73	.75	N W b N	E S E	E	N 67 E	6 0	6.2	13.5	7.88	9.60	...	1.0
28	.860	29.866	29.968	29.9022	14.7	25.2	22.3	21.13	— 3.77	.078	.122	.101	.100	.93	.90	.85	.87	N E	N b W	Calm.	N 15 E	14.6	2.8	0 0	3.72	3.98	...	2.0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...
M	29.7262	29.7002	29.6832	29.7024	18.45	25.86	22.61	22 36	— 1.31	.096	.112	.107	.105	.88	.77	.85	.83	....	......	....	....	6.25	9.50	8.22	......	8.23	0.810	16.8

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR FEBRUARY, 1865.

NOTE.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely, at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer . . . . 30.232 at 11 a.m. on 2nd. } Monthly range=
Lowest Barometer . . . . 29.082 at 6 a.m. on 26th. } 1.150 inches.

Self-registering Ther.:
Maximum temperature . . . 42°2 on p.m. of 22nd, 25th } Monthly range=
Minimum temperature . . . —10°.0 on a.m. of 13th } 52°2
Mean maximum temperature . . 28°64 } Mean daily range=13°12
Mean minimum temperature . . 15°52 }
Greatest daily range . . . . . . 26°0 from a. m. to p. m. of 13th.
Least daily range . . . . 3°8 from a. m. to p. m. of 8th.

Warmest day . . . 22nd ..Mean Temperature . . . 35°62 } Difference=30°.27
Coldest day . . . . 13th ..Mean Temperature . . . 5°35 }

Maximum { Solar . . . . 104°0 on p.m of 25th } Monthly range=
Radiation { Terrestrial . . . . —19°0 on a.m. of 13th } 123°.0

Aurora observed on 4 nights, viz.:—on 20th, 21st, 22nd, and 23rd.
Possible to see Aurora on 13 nights; impossible on 15 nights.
Snowing on 11 days; depth 16.8 inches; duration of fall, 78.4 hours.
Raining on 5 days; depth 0 810 inches; duration of fall, 29.8 hours.
Mean of cloudiness=0.71; Most cloudy hour observed, 8 a.m; mean=0.79; least cloudy hour observed, midnight; mean=0.65.

Sums of the components of the Atmospheric Current, expressed in Miles.

North.	South.	East.	West.
2515.62	446.47	1589.74	2472 27

Resultant direction, N. 23° W.; Resultant Velocity, 3.95 miles per hour.
Mean velocity 8.23 miles per hour.
Maximum velocity 29.0 miles, from 3 to 4 p.m. on 5th.
Most windy day 8th—Mean velocity 17.41 miles per hour. } Difference 16.45.
Least windy day 16th—Mean velocity 0.96 miles per hour. }
Most windy hour, 1 to 2 p.m.—Mean velocity, 9.74 miles per hour. } Difference
Least windy hour, 6 to 7 a.m.—Mean velocity, 5.82 miles per hour. } 3.92 miles.

2nd. Solar halo during the forenoon.
3rd. Rain, freezing as it falls, from noon to 6 a.m. 4th. Dense fog, 8 a.m.
8th. Stormy day, snowing and drifting heavily. 13th. Solar halo, 4 p.m.
18th. Snowing from 9 a.m. to 8 p.m., melting as it falls.
20th, 21st, 22nd, and 23rd. Auroral light in the north.
25th. Rain from 4h. 50m. p.m., freezing as it falls. Very squally.

The month of February, 1865, was comparatively cold, dry, and calm, and the amount of cloudiness equalled the average of the last 12 years.

COMPARATIVE TABLE FOR FEBRUARY.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above Average (¹⁸⁶⁵)	Maximum observed.	Minimum observed.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant. Direction.	Resultant. Velocity.	Mean Force or Velocity
1840	23°.0	+ 5.0	49°.1	— 8°.3	57°.4	8	1.475	6	...	...	...	...
1841	22.4	— 0.6	43.4	— 0.3	43.7	1	Inap.	9	...	...	...	0.61 lbs
1842	26 9	+ 3.9	48.7	+ 2.5	46.2	8	3.625	9	...	...	...	1.03 "
1843	14.5	— 8.5	37.5	—10.2	47 7	1	0.475	21	14.4	...	...	1.05 "
1844	26.0	+ 3.0	47.1	— 0.4	47.5	4	0.430	7	10.0	...	...	0.43 "
1845	26.0	+ 3.0	46.6	— 3.9	50.5	5	Imp.	9	19.0	...	...	0.99 "
1846	20.4	— 2.6	41.4	—16.2	57.6	0	0.000	13	46.1	...	...	0.65 "
1847	21.5	— 1.5	42.2	— 1.0	43.2	2	0.550	13	27.3	...	...	0.69 "
1848	26.6	+ 3.6	46.9	— 0.6	47.5	4	0.775	8	10.8	N 65 W	2.53	5.69 ms
1849	19.5	— 3.5	41.1	— 9.2	50.3	2	0.240	13	19.2	N 41 W	1.48	6.58 "
1850	26.0	+ 3.0	49 2	+ 1.3	47.9	7	1.235	9	23.1	N 80 W	3.43	7.61 "
1851	27.6	+ 4.6	50.2	+ 1.3	48.9	7	2.600	4	2.4	N 64 W	1.99	6.94 "
1852	23.4	+ 0.4	41.2	— 3.2	44.4	3	0.650	11	13.0	S 75 W	3.34	6.42 "
1853	24.1	+ 1.1	43.4	— 0.6	44.0	4	1.030	15	12.6	N 49 W	2.51	7.30 "
1854	21.1	— 1.9	42.7	— 5.7	48.4	5	1.460	15	18.0	N 7 E	1.73	6.91 "
1855	15.4	— 7.6	37.3	—25.0	62 3	2	1.770	14	21.8	N 40 W	4.34	8.17 "
1856	15.7	— 7.3	35.3	—18.7	54.0	0	0.000	8	9.7	N 81 W	7.70	10.71 "
1857	28.5	+ 5.5	51.2	— 5.9	57.1	11	3.050	11	11.7	S 78 W	3.68	9.82 "
1858	17.0	— 6.0	40.9	— 6.6	47.5	1	Inap.	16	26.7	N 72 W	3.22	9.12 "
1859	26.0	+ 3.0	43.3	+ 3.9	39.4	6	0.455	14	8.3	N 54 W	2.72	8.50 "
1860	22.8	— 0.2	48.1	— 8.4	56.5	7	1.330	13	18.8	N 61 W	3.28	8.73 "
1861	26 1	+ 3.1	44.6	—20.4	65.0	4	0 815	17	29.7	N 77 W	3.86	10.58 "
1862	22.5	— 0.5	35.6	— 3.7	39 3	3	0.180	17	23.1	N 55 W	3.93	8.52 "
1863	22.4	— 0.6	38.9	—19.8	58.7	7	1.450	12	22.0	N 23 W	2.27	10.13 "
1864	24.3	+ 1.3	43.9	—13.0	56.9	2	0.397	14	9.5	S 84 W	6.48	10.11 "
1865	22 4	— 0.6	41.0	— 7.0	48.0	5	0.810	11	16.8	N 23 W	3.95	8.23 "
Results to 1864.	22.99	...	43.59	—6.88	50.48	4.2	1.000	11.9	18.05	N 70 W	3.15	8.34
Exc. for 1865.	—0.63	...	—2.59	—0.12	—2.48	+ 0.8	— 0.190	— 0.9	— 1.25	...	...	—0 11

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST.—MARCH, 1865.

Latitude—43 deg. 39.4 min. North. Longitude—5 h. 17 min. 33 sec. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resultant Direction.	Velocity of Wind.					Rain in Inches.	Snow in Inches.
	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M	2 P.M.	10 PM	ME'N		6 A.M	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A.M.	2 P.M.	10 P.M.		6 A.M	2 P.M	10 PM	Re-sul't.	ME'N		
1	30.016	30.042	30.000	30.0163	23.3	27.0	24.8	25.10	— 0.12	.103	.121	.112	.115	.82	.82	.84	.85	N b W	E	E b S	S 89 E	3.0	11.5	17.0	10.88	11.57	...	Inp
2	29.753	29.570	29.658	29.6513	29.1	34.2	35.6	33.20	+ 7.82	.133	.185	.203	.176	.82	.93	.97	.92	E	E b S	E S E	S 87 E	15.8	8.3	0.5	5.12	5.28	0.580	...
3	.734	.728	.706	.7127	34.5	37.4	32.0	34.40	+ 8.68	.136	.103	.106	.116	.68	.46	.58	.58	N N E	N N E	N E b N	N 22 E	1.2	0.5	4.0	3.67	3.71	...	1.0
4	.465	.455	.875	.6063	28.4	31.3	20.1	25.27	— 0.73	.148	.152	.079	.119	.94	.86	.73	.84	N b E	N W b N	N W b W	N 33 W	14.0	30.0	9.4	13.80	14.71	...	5.0
5	.961	.956	—	—	3.9	27.3	—	—	—	.045	.090	—	—	.86	.60	—	—	Calm.	S E	S E b S	S 56 E	0.0	1.5	5.5	2.75	2.83	...	...
6	.875	.850	.752	.8278	13.2	33.1	32.0	26.73	+ 0.30	.071	.138	.151	.122	.90	.73	.83	.82	Calm.	S b W	S S E	S 23 E	0.0	5.2	4.2	3.25	3.32	..	...
7	.615	.434	.390	.4900	23.7	39.6	38.1	35.55	+ 8.73	.098	.184	.191	.160	.76	.75	.83	.75	S S E	S W b S	S W b S	S 85 W	3.2	17.8	5.5	4.90	10.57	Inp.	...
8	.800	.861	.712	.7962	14.7	24.1	23.7	20.70	— 6.53	.072	.071	.118	.090	.85	.54	.93	.80	N W b N	N E	E	N 67 E	8.0	11.5	19.0	12.03	13.52	...	2.0
9	.419	.276	.271	.3240	30.2	36.0	33.8	33.15	+ 5.63	.157	.196	.183	.178	.93	.93	.95	.94	E b N	E b N	W b S	S 83 W	12.0	5.0	13.5	3.69	10.03	0.100	5.0
10	.500	.602	.695	.6108	12.5	19.4	15.4	15.70	—12.12	.062	.068	.077	.067	.80	.65	.87	.74	W b S	W	W b S	S 78 W	15.5	19.0	11.5	11.84	11.97	...	...
11	.651	.500	.619	.6073	13.6	27.7	12.2	17.88	—10.35	.072	.106	.053	.078	.90	.70	.70	.76	W b S	S W b W	N W b N	S 88 W	3.0	16.8	27.5	12.61	16.73	...	1.0
12	30.040	.907	—	—	—0.1	11.4	—	—	—	.037	.068	—	—	.85	.94	—	—	Calm.	S E b E	E	S 78 E	9.0	9.5	10.0	6.37	6.74	...	2.5
13	29.671	.904	.986	.8742	23.3	28.0	22.3	24.12	— 4.85	.116	.109	.085	.097	.93	.71	.71	.75	Calm.	N W b W	N E	N 22 E	0.0	8.0	4.2	5.18	7.82	...	1.0
14	.895	.798	.684	.7895	25.2	30.2	34.5	30.27	+ 0.95	115	.136	.163	.143	.85	.80	.82	.84	E N E	E b N	E N E	N 75 E	13 8	11.0	3.2	7.53	7.55	0.025	...
15	.610	.527	.512	.5478	37.8	47.5	41.0	42.17	+12.45	.217	.283	.246	.249	.95	.86	.96	.92	E b N	Calm.	E N E	N 63 E	1.8	0.0	5.5	3.13	3.15	...	...
16	.364	.091	.228	.2217	42.5	47.5	36.7	41.40	+11.37	.263	.327	.155	.245	.97	.99	.71	.91	N E b E	E b N	W b S	S 59 W	6.8	7.0	18.0	5.13	10.35	0.650	0.3
17	.320	.347	.075	.2477	30.9	40.3	37.0	36.32	+ 5.87	.149	.185	.193	.176	.86	.73	.87	.81	S W	S W b [illegible]	E	S 60 W	7.5	17.0	8.5	11.42	14.09	0.050	Inp.
18	.480	.725	.821	.6942	33.1	39.9	33.1	35.37	+ 4.52	.138	.121	.167	.140	.73	.49	.88	.69	W N W	W b S	S W b W	S 81 W	27.5	24.5	6.5	14.46	14.74	...	...
19	.880	.778	—	—	30.2	41.7	—	—	—	.149	.167	—	—	.89	.62	—	—	W	S S W	Calm.	S 48 W	4.0	6.2	0.0	2.26	2.58	...	...
20	.616	.533	.462	.5288	36.3	39.6	37.4	38.02	+ 6.35	.168	.185	.196	.184	.78	.75	.87	.80	Calm.	S S E	Calm.	N 72 E	0.0	4.0	0.0	1.98	2.41	0.250	...
21	.342	.166	28.861	.0937	35.6	43.5	43.5	42.33	+10.25	.193	.250	.278	.254	.93	.89	.98	.93	E b N	E b N	E N E	S 25 E	0.8	1.0	4.0	1.77	4.03	0.660	...
22	28.736	28.746	28.887	28.7997	36.3	36.0	33.1	34.90	+ 2.42	.185	.165	.167	.170	.86	.77	.88	.83	S S W	W	W b S	S 71 W	24.2	15.5	20.2	17.15	18.88	0.245	1.0
23	28.974	28.975	29.094	29.0045	36 3	42.8	32.4	36.62	+ 3.83	.176	.213	.131	.168	.82	.77	.71	.76	W	W b N	W	N 85 W	18.0	24.8	12.0	16.06	16.35	...	...
24	29.075	29.182	.393	.2317	30.9	36.0	33.1	33.63	+ 0.47	.134	.162	.160	.152	.77	.76	.85	.79	W b N	N W	W b N	N 56 W	12.8	19.5	7.0	11.27	11.64	...	...
25	.460	.488	.672	.5605	31.3	34.5	28.8	31.35	— 2.22	.160	.144	.129	.145	.90	.72	.81	.82	N W b N	W b N	N W b N	N 40 W	4.0	6.5	15.0	10.97	11.14	...	0.1
26	.817	.913	—	—	27.3	37.0	—	—	—	.133	.124	—	—	.89	.56	—	—	N W b N	W b N	N W b N	N 58 W	10.0	8.0	1.0	4 90	5.72	...	...
27	.976	.879	.857	.9017	31 6	46.4	39 6	39.45	+ 5.03	.156	.259	.176	.192	.87	.82	.72	.78	Calm.	S b W	Calm.	S 53 E	0.0	6 5	0.0	1.14	3.66	...	...
28	.861	.823	.747	.8093	37.4	42.1	40.7	39 77	+ 5.05	.196	.152	.145	.162	.86	.56	.56	.66	N E b E	E N E	E b N	N 73 E	10.5	16.0	10.0	10.87	10.89	...	...
29	.710	.630	.588	.6437	36.7	45.7	41.4	41.02	+ 5.92	.188	.211	.250	.217	.86	.68	.95	.84	E b N	E	Calm.	N 59 E	0.4	4.8	0.0	0.94	1.24	0.490	...
30	.577	.459	.342	.4507	39.6	54.4	45.0	45.67	+10.17	.194	.174	.230	.203	.79	.40	.77	.67	N b W	N E	N b E	N 15 E	2.2	7.0	7.2	6.64	6.91	...	...
31	.306	.223	.126	.2067	40.3	54.0	39.6	45.78	+ 9.87	.159	.191	.185	.161	.63	.45	.75	.52	N b E	S E b S	S W	N 30 W	10.5	7.2	0.5	5.76	8.68	...	...
M	29.5482	29.5116	29.5190	29.5277	29.94	37.71	32.85	33.55	+ 3.17	.147	.170	.160	.159	.84	.72	.82	.79	....	....	....	....	7.44	10.68	8.08	......	8.80	3.050	18.9

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR MARCH, 1865.

Note.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer..........................30.058 at 8 a.m. on 1st } Monthly range =
Lowest Barometer ... .28.707 at 11 a.m. on 22nd } 1.351 inches.

Self-regist'ing Thermom.
Maximum Temperature .... 55°6 on p.m. of 30th } Monthly range =
Minimum Temperature ....—3°5 on a.m. of 12th } 59°1
Mean maximum Temperature .... 39°29 } Mean daily range =
Mean minimum Temperature .... 25°11 } 14°18
Greatest daily range ......26°8 from a.m. to p.m. of 5th.
Least daily range............ 4°3 from a.m. to p.m. of 4th.

Warmest day ....31st... Mean temperature.......... 45°78 } Difference = 30°08
Coldest day ....11th... Mean temperature .... 15°70 }
Maximum Radiation. { Solar...................................109°0 on p.m. of 19th } Monthly range =
{ Terrestrial.......................—12°5 on a.m. of 12th } 121°5
Aurora observed on 3 nights, viz:—15th, 20th and 30th.
Possible to see Aurora on 11 nights; impossible on 20 nights.
Snowing on 12 days; depth 18.9 inches; duration of fall, 56.4 hours.
Raining on 10 days, depth 3.050 inches; duration of fall 59.5 hours.
Mean of cloudiness = 0.78.
Most cloudy hour observed, 4 p.m.; mean = 0.84; least cloudy hour observed, midnight; mean, = 0.72.

Sums of the components of the Atmospheric Current, expressed in miles.

North.	South.	East.	West.
1899.17	1124.68	1868.04	3274.06

Resultant direction N. 61° W.; Resultant velocity 2.16 miles per hour.
Mean velocity ....8.80 miles per hour.
Maximum velocity .... 34.2 miles, from 2 to 3 p.m. on 4th.
Most windy day ......22nd............Mean velocity, 18.88 miles per hour. } Difference =
Least windy day......29th............Mean velocity, 1.24 ditto } 17.64 miles.
Most windy hour ...... 2 to 3 p.m.........Mean velocity, 10.88 ditto. } Difference =
Least windy hour...... 6 to 7 p.m.........Mean velocity, 7.43 ditto. } 3.45 miles.

5th. Lunar halo during evening.—6th. Lunar halo very perfect.—9th. Dense fog during evening.—15th. Dense fog at midnight.—16th. Dense fog all day.—20th. Thunder storm with heavy rain, (first of season)—20th. Solar halo in afternoon 21st. Solar halo in morning.—23rd. Solar halo during forenoon.—30th. Solar halo during forenoon.

The month of March, 1865, was comparatively warm, wet, and cloudy.

COMPARATIVE TABLE FOR MARCH.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above aver'ge (26°2)	Max. observed.	Min. observed.	Range.	No. of days.	Inches	No. of days.	Inches	Resultant. Direction.	Resultant. V'y.	Mean Force or Velocity.
1840	°33.3	+ °3.4	°56.9	°8.7	°48.2	8	1.640	8	...	...	...	....
1841	27.7	— 2.2	53.5	— 6.9	60.4	5	1.170	7	...	...	...	0.51 lbs.
1842	35.8	+ 5.9	68.7	14.9	53.8	4	3.150	8	...	...	...	0.70
1843	21.3	— 8.6	38.6	— 2.8	41.4	2	0.625	18	25.7	...	...	1.18
1844	31.3	+ 1.4	50.3	9.6	40.7	8	2.470	8	14.0	...	...	0.57
1845	35.4	+ 5.5	61.7	9.9	51.8	5	Inap	8	2.8	...	...	0.66
1846	33.1	+ 3.2	49.3	7.6	41.7	9	1.965	5	2.3	...	...	0.30
1847	26.2	— 3.7	44.3	4.8	39.5	5	0.850	6	4.2	...	...	0.71
1848	28.6	— 1.3	58.9	0.9	58.0	5	1.220	6	9.7	N 66° W	2.03	5 80mls.
1849	33.5	+ 3.0	53.4	15.4	38.0	7	1.525	2	2.3	N 3° W	1.48	5.37
1850	29.8	— 0.1	46.0	6.0	40.0	2	0.745	7	11.2	N 52° W	2.62	7 62
1851	32.4	+ 2.5	58 7	13.1	45.6	3	0.770	9	8.8	N 21° W	1.93	7.65
1852	27.7	— 2.2	44.8	— 3.2	48.0	8	3.080	12	19.5	N 8° W	0.71	5.81
1853	30.6	+ 0.7	56.3	— 0.1	56.4	6	1.080	8	7.1	N 58° W	2.60	5.96
1854	30.7	+ 0.8	52.8	10.4	42.4	9	2.425	3	2 8	N 53° W	3.39	8 03
1855	28.5	— 1.4	48.6	— 2.9	51.5	5	1.483	11	18.1	N 88° W	4.76	9.95
1856	23.1	— 6.8	39.3	—13.6	52.9	0	0.000	12	16.2	N 71° W	7.68	11.59
1857	27.8	— 2.1	56.5	— 3.9	60 4	4	0.335	15	11.3	N 63° W	6.63	10.84
1858	28.4	— 1.5	54.1	— 5.5	59.6	10	0.917	6	0.2	N 58° W	5.45	8.56
1859	36.3	+ 6.4	53.7	10.4	43.3	15	4.054	8	1.0	N 64° W	1.96	10.39
1860	34.5	+ 4.6	66.4	14.2	52.2	5	0.882	11	2.4	N 64° W	7.61	12.41
1861	26.9	— 3.0	43.2	— 4 1	47.3	8	2.125	14	7.1	N 54° W	4.33	10.56
1862	28.8	— 1.1	41.4	9.3	32.1	8	2.560	11	18.5	N 12° W	2.50	9.38
1863	25.8	— 4.1	41.4	— 3.4	44.8	4	0.687	17	11.4	N 27° W	2.62	9.27
1864	29.1	— 0.8	45.7	3.5	42.2	9	1.629	12	3.7	N 53° W	2.29	8.41
1865	33.6	+ 3.2	54.4	— 0.1	54.5	10	3.050	12	18.9	N 61° W	2.16	8.80
Results to 1864.	29.86	...	51.38	3.69	47.69	6.2	1.557	9.3	9.10	N 57° W	3.35	8.67
Exc for 1864.	+ 3.69	...	+ 3.02	—3.79	+ 6.81	+ 3.8	+ 1.493	+ 2.7	+ 9.80	....	.. ..	+ 0.13

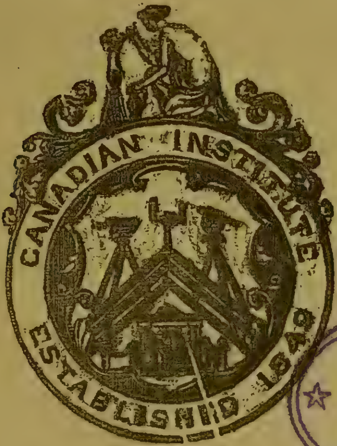
23

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE
CANADIAN JOURNAL
OF
INDUSTRY, SCIENCE, AND ART:

CONDUCTED BY

THE EDITING COMMITTEE OF THE CANADIAN INSTITUTE.



NEW SERIES. No. LVIII.

SMITHSONIAN INSTITUTION
MAY 28 1940
NATIONAL MUSEUM

JULY, 1865.

TORONTO:
PRINTED FOR THE CANADIAN INSTITUTE,
BY LOVELL AND GIBSON, YONGE STREET.

CANADIAN INSTITUTE.

EDITING COMMITTEE.

GENERAL EDITOR - - REV. WM. HINCKS, F.L.S.

I. *Geology and Mineralogy:* E. J. CHAPMAN, Ph.D., Prof. of Geology and Mineralogy, Univ. Coll. Toronto.

II. *Physiology and Natural History:* REV. WM. HINCKS, F.L.S., Prof. of Natural History, Univ. Coll., Toronto.

III. *Ethnology and Archæology:* DANIEL WILSON, LL. D., Prof. of History and English Literature, Univ. Coll., Toronto.

IV. *Meteorology:* G. T. KINGSTON, M.A., Director of the Magnetic Observatory, Toronto.

V. *Chemistry:* HENRY CROFT, D. C. L., Prof. of Chemistry and Experimental Philosophy, Univ. Coll., Toronto.

VI. *Mathematics and Natural Philosophy:* J. B. CHERRIMAN, M. A., Prof. of Natural Philosophy, Univ. Coll., Toronto; and the Rev. G. C. IRVING, M.A., Prof. of Mathematics, Trin. Coll., Toronto.

VII. *Engineering and Architecture:* SANDFORD FLEMING, C. E.

VIII. *Philology:* REV. E. HATCH, B.A., Prof. of Classics, Morin Coll., Quebec.

The Canadian Journal is printed exclusively for gratuitous distribution among the Members of the Canadian Institute, and such Institutions and Societies as the Council may determine; but Members may purchase extra copies at 2s. 6d. per number, and Provincial Literary and Scientific Societies may obtain the Journal at the same rate, by an annual payment in advance.

⁂ *Communications for the Journal to be addressed to the General Editor,* Prof. HINCKS, *Univ. Coll., Toronto. Communications on general business of the Institute, to be addressed to* U. OGDEN, *Esq., M.D., Corresponding Secretary, or to Mr. Jas. Johnson, Assistant Secretary, Canadian Institute, Toronto.*

☞ MR. EDWARD ALLEN, 12, Tavistock Road, Covent Garden, London, W, has been appointed the English Agent for the Institute. All European communications are requested to be forwarded through him.

.C23

THE CANADIAN JOURNAL.

NEW SERIES.

No. LVIII.—JULY, 1865.

ON ERRATA RECEPTA, WRITTEN AND SPOKEN.

BY THE REV. DR. SCADDING,
LIBRARIAN TO THE CANADIAN INSTITUTE.

(Continued from Vol. IX. *p.* 326.)

III. Foreign Words Anglicised—*(continued.)*

3. *Anglicised German Words.*

The bulk of our English speech is Anglo-Saxon; and Anglo-Saxon itself was, antecedently, a composite product of several Low German dialects. It is no part of my undertaking to notice differences in words essentially identical, differences occasioned by the legitimate growth of a national language. Nor am I to remark upon unadulterated German words, or German words very nearly unadulterated, such as gneiss, quartz, schale, spar (spath), felspar (felspathic), grauwacke, muschel-kalk, floetz, (schist is not German), gas, sitz, seidlitz, nickel, mangel-wurzel, &c. These have been confessedly borrowed by us for convenience, just as Germans, at the present time, are borrowing terms, like essay, self-government, &c., from the English.

I simply design to point out instances of words or terms which have passed into our language from German dialects, but which, after adoption and naturalization, have neither been preserved strictly in their native shape, nor, in some cases, used in their proper relations. In my collection I may include some instances not of very recent introduction, which may therefore from familiarity of use, not at the first glance be obvious examples of *errata recepta;* and some, that, although they may have reached us through the Italian and French, yet entered those languages from Teutonic dialects, and cannot be understood etymologically in English without an acquaintance with this fact in their history.

1. To begin, then, with some of the parts and materials of a house, and some familiar objects in and about a house. I mention first a word which will be more familiar to the Canadian than the English reader. The partially-closed-in verandah often attached to the kitchen-part of a farm-house is commonly called with us, a *stoop.* This is the Low German *stoep,* and properly signifies the step, or platform before the door. Again, *shingle,* a slate of cleft-wood, so to speak, is strictly *schindel,* High German for the same thing. In like manner, *deal,* applied by us to a plank of pine-wood exclusively, is *diele,* denoting in German any kind of plank. *Clapboard* is the Low German *klap-hout, hout* being *wood* or *timber. Sas,* a word in the same dialect, signifying a *sluice,* gives us *sash,* in window-sash; the frame containing the glass ascending and descending after the manner of a sluice-gate. A sash is thus, in idea as well as in fact, an air-sluice. *Lobby* and *lodge* are ultimately the High German *laube,* a bower of *lauben,* i.e. leaves. *Lodge* has come to us through the French *loge* and the Italian *loggia;* but these are both the Old High German *laubja,* the same as the modern German *laube. Laubja* was Latinized into *laubia,* whence the Grison *laupia,* and the Piedmontese *lobia,* first a gallery in a church, then our *lobby. Loggia* in Italian still denotes a leafy verandah; thus in "Italian Pictures," in *Blackwood,* January, 1865:—

> "I sit upon my loggia, where the vines
> Spread their green shadow to keep off the sun."

Hamper, hanniper, meaning now with us, a kind of basket, is the Old High German *hnapf,* a bowl or basin, written in the modern language *napf.* In the expression *hammer-cloth, hamper* has undergone a further transformation. *Ticket,* coming to us through the French *étiquette,* (formerly *estiquette*) is from the German verb *stechen,* and has reference, in the first instance, to the "bills" which we see "stickers" sometimes notified not to affix. *Towel*, intermediately French or Italian, is the Old High German *twahilla*, from *thwahan*, to wash. *Eiderdown* is *eiderdunnen*. *Bolster* is *polster*. *Spool* is *spule*. *Clock* is *glocke*, really, the *bell*. *Shuttle* is an adaptation of *schutteln*, to vibrate. *Can*, a vessel to hold fluids, is the same as the German *kanne*; but with us, without doubt, it is the Anglo-Saxon *canne*. It may be recognized as the stem-syllable of *can-alis*, and *can-tharus*. *Fauteuil*, generally held to be an arm-chair, is the Old German *faltstuol*, properly a seat that folds up, like the portable *sella curulis* of the Roman magistrate. Our old English word *faldstool* is sometimes wrongly taken to be a kind of devotional desk.

Sleigh, the soft word which, in the United States and throughout British America, has so fittingly improved upon and displaced the heavy-sounding, inappropriate *sledge*, is a modification of *sledge* under the influence of *schlitten* or *schleife*, German for the same thing. In 1759, this word was written *sley*. Thus in "Journals of Excursions in the Late War in North America," London, 1765, by Major Robert Rogers, p. 161, we are told "My own *sley* was taken with £1196, York currency, in cash." Again, at page 130, in a letter from Col. Haldimand to Major Rogers, dated March 10th, 1759, "I congratulate you heartily on your good success, and send you twenty-two *sleys* to transport your sick."—It would have been well, perhaps, had this form of the word continued.—Correctly speaking, *Sleigh* is a proper name, of considerable antiquity in England and Scotland, according to Burke's "General Armory." Has it, as such, like Dennet, Brougham, Hansom and the odious Buggy, in parallel cases, had anything to do with the cis-Atlantic term for our swiftly-gliding winter-vehicle?

2. Among names of edibles we have one or two Anglicised German words. In *sour-krout* we simply write in an English form the German *sauer-krout*; just as the beverage which, a few years ago, used to be advertised as *lager-bier*, is now generally announced in the windows plainly as *lager-beer*. Out of *sauer-krout* the French have made *chou-kroute*,—a tautology, both syllables denoting the same thing.—A certain preparation, or, to adopt an old English term, a furmety, or frumenty, of Indian-corn-meal, is, with us, popularly designated *mush*. This is the German *mus*, by which toothsome comestibles of various kinds are denoted.—*Kruller*, the *curled*

or twisted cake to be found generally on the table of country-inns, is an unchanged Low German word.

3. In the animal kingdom,—we give to a certain kind of fish the name of *bass*. We have here a corruption of the German *bars*, which is properly the *perch*. Again, the rein-deer is in reality the *running-deer*, being the German *renn-thier*, derived from *rennen*, to run. *Reynard*, the popular sobriquet for the fox, which, in French, supplanting *goulpil*, has ceased to be a proper name, is the German *Reinhart* or *Reginhart*, 'powerful in counsel,' the title given to the fox in the celebrated fable of *Reineke de Vos*, written in 1498, by Nicholas Baumann, under the pseudonym of *H. van Alkmaar*.

The syllable *mouse* in *titmouse* is an Anglicising of the Low German *musch*, which is simply 'sparrow.' In like manner, 'hammer' in *yellow-hammer*, is the High German *ammer*, i.e. the bird called a 'bunting.' *Cob-web* is the web of the *spinnekop*, Low German for 'spider.' *Capon* is *kapphahn*. By *fugleman*, *flugel-man* is intended to be said.—*Isinglass* in English, is *hausenblase* in German: on which side is the corruption?

A common United-States and Canadian term, denoting a pair of horses, is the Low German *span*, in the phrase *een span paarden*, a team or set of horses. Unapprised of this verbal usage, the English reader would not catch the supposed wit of the American fast youth who, on hearing that "Life is but a span," is reported to have remarked, "And I am your man to drive it."

4. In the vegetable world: our *bass-wood* (the lime, linden, tilia or whitewood,) is more correctly *bast-wood*, from the Low German word *bast*, inner bark. *Krause-beere*, the rough berry, has been transformed by us into *gooseberry*. Dr. Johnson suggested *gorseberry*. The French have made it *grosseille*. *Pompion* (pumpkin) is the Low German *pompoen*. Has *cranberry* anything to do with *kronsbeere?* *Cabbage* comes to us from the Low German *kabuiskool*, headed-cole; but this is from the Italian *cappuccio*.

5. In relation to money,—*groat* is the Low German *groot*, and signifies the *great* coin, equivalent to four silver pennies. With this compare *groschen* and the French *gros sou*. *Shilling* is *schilding*, the coin bearing a *shield* with the royal or national arms. Some say it is from the Swedish *skilja*, to divide.—*Dollar* is *thaler*, coin struck in the first instance (A.D. 1518), from silver of the Thal of Joachim in Bohemia. Here, again, others will have it that the word

is connected with *theilen,* to deal out.—*Pewter* is the Old German or Teutonic *peauter,* white brass. *Bourse,* being now almost English, may be admitted into our list. The term is thus accounted for. The meeting-place for merchants at Bruges in the 14th century happening to be in a house once inhabited by the noble family of *van den Beurse,* whose armorial cognizance of three *purses* was sculptured over the door, the building became known as the *Beurse,* and supplied a name for buildings similarly used elsewhere. *Bourse* itself is, of course, a descendant of the Late Latin *bursa,* a leather-purse. (We may have occasion to detail hereafter other instances of buildings accidentally entailing their names; as, for example, the old Parisian convents of the Jacobins, Feuillants, and Cordeliers.)

6. Among military terms, we have *knapsack,* properly *schnapp-sack,* a pouch for carrying *schnapps,* provisions on the march. Again, *havresack* is *hafersack,* a bag for *hafen,* oats; a word recalling the time when a *meal* had a literal significance.—*Bivouac* also is German. It is altered from *beiwacht,* expressive of the extra-amount of vigilance necessary to be maintained by an army suddenly encamping without defences.—The well-known French term *auberge,* and Italian *albergo,* a way-side inn, are modifications of the Old High German *heriberga,* quarters for an army when marching through a province. Our terms *harbour* and *arbour* have properly the same signification. But they have come to us through the Anglo-Saxon *here-beorga.* *Harbinger* is a person sent forward to see that quarters are in readiness for an approaching military force. The numerous *Cold-harbours,* to be met with in various counties of England, are said to have been farms, outposts, or garrisons of Roman Colonies. They are generally found near a Roman road or settlement. If the suggestion is correct, *Cold,* in these words, is a corruption of *Col,* i.e. *Colonia.*

A *marshal* was originally the groom in charge of the King's horses. (Old High German *marah,* horse, and *scalc,* servant.) This person was next required to see to the ordering of companies of horse on the field of battle and elsewhere, under the *comes stabuli,* the count of the stable, the Grand Constable. At last the term is applied to the highest rank in the army.—In French, a *farrier* is still a *marechal.* (*Seneschal,* not unknown in our poetry, is O.H.G. *sini,* old, *scalc,* as above.)

Hauberk and its diminutive *habergeon* are given in the English

Dictionaries (e.g. in Ogilvie's and Worcester's), as from the French and German. These terms, however, have descended to us from the Anglo-Saxon, also. In Bosworth we have *healsbeorga*, defence for the neck. [*Halter*, through the French *halterel*, is likewise from *hals*, the neck.]—*Arquebus* is the German *haken-buchse*, i.e. a *buchse* or gun fired from a crotch or rest, *haken*. The Italians have made of this word *arcobugio*, as if it were a perforated cross-bow (*bugio* perforated); whence the suggestion, ingenious but baseless, of a French etymologist, *arc-à-buse*, bow with a tube.—We, in our English way, have persuaded ourselves that the Low German *donderbus* (thundergun), is *blunderbus*. *Howitzer* is *haubitze*, and *halberd*, *hellebarde*.—*Truce* is the Old German *triuwa*. It has in it the word *true*, and expresses a fœdus or faithful compact between belligerents. It was Latinized into *treuga*, where the *g* is made to represent *w*. *Fife* is the German *pfeife*, as *flute* is *flöte*. Finally, the phrases 'to ask quarter,' 'to give quarter' are said to have originated in an understanding between the Netherlanders and Spaniards, to the effect that the life-ransom of a soldier, of whatever rank, should be a quarter of his year's pay.

7. In connexion with ships—we have *skipper*, which is the Low German *schipper* (H. G. *schiffer*), and the Anglo-Saxon *scipere*, sailor. *Bowsprit* is L. G. *boegspriet*, the spar which *sprouts* from the bow. (*Spritsail* is a sail sustained by a *sprit*.) *Starboard* is H. G. *steuerbord*, the direction in which, with reference to the steersman, is the helm; *larboard*, is probably *babord*, i.e. L. G. *bakboord*, the direction in which, in the same relation, is the ship's side. *Bunting* is from H. G. *bunt*, variegated in colour. Literally, therefore, it is the material out of which the ship's *colours* are made. *Orlop* is L. G. *overloop*; *sheets* are L. G. *schooten*, and *sheaves* H. G. *scheiben*; *tar* is H. G. *theer*, and *pitch* is H. G. *pech*. *To belay* is H. G. *belegen*. We have Anglicised into *windlass* the L. G. *wind-as*, which is the H. G. *winde-achse*, the *axis* or *axle* for winding the cable on.—*Sloop* is the L. G. *sloep*, and *schooner* the H. G. *schoner*. *Yawl* is the L. G. *jol*, which gives us *jolly-boat* also. *Smack* is the H. G. *schmact*; *hoy* is the H. G. *heu*. *Yacht* is the H. G. *jacht* (and Danish *jaht*), from *jagen*, to hunt or ride quickly. It is properly a boat towed by horses. A vessel is said to be *crank*, when liable to upset from being too narrow, or from not being sufficiently ballasted. This is the H. G. *krank*, properly sick, out of sorts. [*Binnacle*,

formerly *bittacle*, should be added to our instances of Anglicised French. It is from either *habitacle* or *boite d'aiguille*, both terms denoting the receptacle for the compass. *Capstan* is Spanish—*cabrestante*, goat-rampant. *Ketch* is Italian, *caccia*.]

8. Our English changes in German and other proper names are to be considered in a future section. If we may rely upon the theory of Mr. Ferguson, as set forth in his work entitled "The Teutonic Name-System applied to the Family Names of France, England and Germany," the most wonderful misconceptions are in vogue in relation to proper names, owing to their vernacularisation in English, French and German. Some of the more striking of these alleged misinterpretations we shall give in the proper place. In the mean time, we notice in passing that we have made Cape *Horn* out of Cape *Hoorn*, which has its name, not from its shape or appearance, as might be imagined; but from *Hoorn* in Holland, the native place of the navigator Schonten, who first doubled this promontory in 1616. The two names, however, are identical in meaning; and promontories or extremities of islands were *cornua*. Thus Corn-wealas in Britain, and Cornouailles in Brittany both have reference to the Wealas or Celtic foreigners, as the later-arrived Teutons would speak, inhabiting narrow headlands jutting out into the sea—*pens*, as they would be termed by the Celtic people themselves. Supposing κέρας (horn) and *cairn* (visible memorial pile) to be allied in root, Cornubia, the Late Latin appellation of Cornwall, may convey the graphic impression of a region of rock-piled masses. Richard of Cirencester even asserts that its inhabitants were *Carn-abii*.—The *bosch-man* of the Cape has become *bush-man* with us. The country-farmers of the same colony, in their own language *boers*, with us are now *Boors*, without, however, the depreciative sense usually attached to the term. *Pieter-Both*, a mountain in the Mauritius, we in like manner Anglicise into *Peter-Botte*. *Delft* we make *delf*. *Prusse*, Prussian, we have transformed, in one instance, into *spruce*. Nay in more than one, for *spruce-fir* means, I believe, the tree with the bark of which Prussian leather is tanned.—*Sclave*, i.e. Slavonian, we, as other nations, have transformed into *slave*. Previously, the *Serbs*, a subdivision of the Sclaves, had furnished *servus* and *serf*. Dolopia, on the contrary, would seem to be a national name derived from δοῦλος.—*Swiss*, in one department of French terminology, has come to be a synonym for a Church-beadle. In the phraseology

of the late Confederation in the United States, the soldiers of the North were *Hessians.*—*Contraband,* which in our time has acquired the force of a proper name, euphemistic for *negro,* is of German descent: it is something imported in contravention of *ban* or public edict.

9. I come now to miscellaneous examples. And first, I notice *bos,* the style and title under which lumberers, surveyor's asssistants, workmen in manufactories, farm-laborers, and others, commonly, among themselves at least, speak of their employer. It is the Low German *baas,* having exactly the same import. Netherlanders have the phrase *den baas spelen,* to act the bos, to domineer.—*Drug* is the L. G. *droog,* literally *dry,* having reference to the herbs, roots and barks of the primitive pharmacopœia.—*Copperas* is probably *kupferwasser. Potash* is the plain English of *pott-asche,* which is the original also of the mongrel Latin *potassium.* The *maulstick* of the artist is *mahler-stock* Anglicised, *mahler* being *painter.*—*Jig* is the H. G. *geige,* from *gehen* to go or move. (The French *gigot* means the *violin-shaped* joint.) *Buskin* is the L. G. *broose-kin,* a diminutive of *broos,* a leather-cothurnus.—*Smug,* and *arch,* in the special sense of sly or shrewd, are H. G. *schmuct* and *arg.*—The *shark* of the Exchange is the L. G. *schurk,* an uncomplimentary appellative.—*Hurly-burly,* although explained otherwise also, is, according to some, from *ehrlich,* honest, and *wahrlich,* true-ly.—*Cricket,* the game, appears to get its name from *krack-e,* a trestle or wooden horse, i.e. the wicket. (May *Croquet* be a modification of *cricket?* Or has it anything to do with a well-known abbreviation of *Crockford,* a name associated, temp. Geo. IV., with a not dissimilar game?)—*Haberdasher* is from *habt-ihr-das?* 'have you that?' Others explain the term by a reference to *habe,* wares, and *tauschen,* to exchange. It has also been assigned, with less probability, to a French source, *avoir d'acheter.* The verbs, *to dismay, to carouse, to shore up, to eschew, to lure* or *allure* are transformations of Teutonic words. *To dismay* is *dis* (privative), *magan,* the same as *machen,* to make. Hence it means *to unmake, undo, render inefficient through fear,* &c. *Carouse* is deduced from the L. G. *kroes,* cup. Others fetch it from a greater distance—from H. G. *gar aus,* quite (drained) out. *To shore up* comes from the L. G. *schoor. To eschew* is the H. G. *scheuen,* to shun or be shy of. *To lure* or *allure* is to bring back the falcon to the hand by means of the *luoder,* O. H. G. for the piece of

coloured *leather* used for the purpose.—The low Americanism *loafer* is a curtailed form of the German *herum-laufer,* one who vagabondizes about (*herum,* circum, and *laufen,* to run.) Some such word existed in the English of former days. In the Play of "Sir John Oldcastle," attributed occasionally to Shakespeare, the term *leufter* occurs. (See Act v., Sc. 2.) The annotators cannot with certainty explain it. They suggest that it may be for *leuterer,* i.e. loiterer. It is put in the mouth of an Irish character. In Spanish there is a term equivalent in sense, and somewhat similar in sound—*gaglioffo.* It denotes, first, a strolling French pilgrim to the shrine of St. Iago, where, for such persons was provided a dole called *Galli offula* ; and, secondly, any vagrant character. *Gaglioffo* may have crept into Ireland and England from Spain.

The ecclesiastical expression *ember-day* unexpectedly proves to be Anglicised German. It is thus deduced. Latin *Quatuor tempora,* (i.e., since A.D. 1095, the Wednesday, Friday, and Saturday after 1st Sund. in Lent, Whitsunday, Sept. 14th and Dec. 13th, respectively), corrupted into *Quatember.* This then in L. G. passes successively into *Kottemper, Tamper, Tamper-dag, Ymber-dag,* transformed by us, under the influence probably of *dies cineris,* ash-wednesday, into *ember-day.*—By steps somewhat similar an attempt has been made to shew that *Whitsun* in *Whitsun-day* is a descendant of the H. G. barbarism for *pentecost,* viz., *pfingsten.* Corruption, however, as *Whitsun* probably is, it is not proposed to be thus derived. Its orthography in the days of Wycliffe and the early translators, was *Witson* or *Wytson.* Up to about the twelfth century the name of the festival was the same in England as on the Continent; but the technical *Pentecost* then began to be displaced by the vernacular *Witson*—a term understood to be indicative of the season when the first Christian disciples became, in the highest sense, "sons of wit," children of wisdom; some such text as this being glanced at—"*vos docebit omnia*;" or this, "*sapientia est justificata ab omnibus filiis suis.*"—The conversion of *wit* into *white,* and the attributing of the name to the white vestments of neophytes were later popular misapprehensions.

Finally, the word *country,* though not an Anglicised German term, had nevertheless its origin in a transformed Teutonic idiom. Its history is said to be this.—*Gegend,* country or region, is literally that which is *gegen,* over against you. An early Teuton, attempting to convey to a Roman mind the idea involved in the native term *gegend*, coined some such word as *contrata* or *contrada*, "the things which are *contra*, over against you." The complaisant Roman is then supposed to have afterwards employed the barbarism of his master, to the neglect of *patria*, or whatever other Latin expression he would naturally have used. Thus the word from which we get our pregnant English term *country* became established in the Italian, Provençal and French.—It is curious to observe how *contra* has Anglicised itself into *country*—in *country-dance*; and into *counter*, in *counteract*, *counterblast*, &c.

(*To be continued.*)

THOUGHTS ON BELIEF AND EVIDENCE.

BY THE REV. WILLIAM HINCKS, F.L.S., F.B.S., EDIN.
HON. MEMBER OF THE LIVERPOOL LIT. AND PHIL. SOC., YORKSH. PHIL. SOC., BOT. SOC. OF CANADA, CORRESPONDING MEMBER OF THE ESSEX CO. INSTITUTE AND THE BUFFALO NAT. HIST. SOC., PROFESSOR OF NAT. HIST. UNIV. COLL., TORONTO.

If I had any idea of treating this subject in such a manner as to attempt both to establish just principles, and to derive from them practical rules, I should need a considerable volume instead of a short essay; but all that I now propose is a summary view of theoretical principles. Some thirty years ago, when my professorial duties obliged me to give close attention to questions in the philosophy of mind and the science of evidence, and when what had then been written on the subject was frequently in my hands, I was persuaded that the sensational philosophy, as it has been termed, in the form in which I held it, cleared away difficulties, and enabled me to present the whole subject in a peculiarly satisfactory manner. During the greater part of the time which has since elapsed, I have ceased to read much on the subject, and have but a slight acquaintance with the great works which have since been produced; but my attention having been recently strongly directed to past speculations, of which the loss of all my papers has left me no record but what memory furnishes, I ask the indulgence of this meeting to a few remarks, which, I hope, may not be entirely unworthy of notice, though much study of what has been written since my inquiries would be necessary to enable me to make them what I would wish. The importance of the subject no one will question, and, probably, the most generally received notions are much at variance with those I shall present.

Most people think that they know very well what is meant by belief, yet such is the looseness with which language is employed that there are really several distinct states of mind, which, in accordance with approved custom, are designated by this name, and of this fact few seem to be aware.

Belief in a mathematical theorem, in a scientific generalization or natural law, in a series of facts or events not perceived by our own senses, in the occurrence of some change as the consequent to a known antecedent, and in the existence of what we have perceived by our own senses, is by no means produced in all these cases by the same process, nor is the state of mind produced identical. Somewhat different still is the belief in various opinions impressed upon our minds in early years, or communicated to us by those around us, of which most of us have never properly examined the sources or grounds, although the feeling of believing them may be strong. It may be worth while to examine these cases somewhat particularly, that we may observe how they differ in their origin and nature. We will begin with what seems simplest, the case of our own sensations present or past. We are so constituted as to experience sensations in certain combinations, and in a certain order, as we say, from external objects; though some philosophers contend that we know the sensations, and do not know their external causes, which, they allege, that we believe in without reason. However this may be, we have the sensations, and to have them is to believe them. The belief is not a consequence of having them, or the result of the application to them of some faculty or some mental process, but it is the very state itself of experiencing them. When we say we believe them, we mean nothing more or different from saying that we have them. No evidence could possibly be offered to convince us that we have them if they are not part of our consciousness. As to their having external material causes, an invariable association in all human minds refers them to such, or, in other words, the state which we call the perception of externality of objects arises from certain clusters of sensations in all minds; and those who argue against the existence of the causes have the same feeling on the subject as others, which is not an inference true or false, but something so involved in the mode of our receiving the sensations, that to have the sensations is to believe not in them only, but in their external causes, nor is it easy to conceive of such an invariable effect, in all minds, being delusive and unreliable. But whatever may be said of the external causes, the existence of the sensations is undeniable, and to experience them is to believe them, there being no place for any evidence on the subject. It may be said that we are deceived even in our sensations, having afterwards, if not at the moment, full assurance that certain supposed perceptions of our organs of sense were not to be trusted; or, if we remain under the delusion, it being fully known to others that we are misled, so that a reasonable man would not rely too firmly even on the evidence of sense. There is some truth in this, yet not so as to invalidate our previous statement respecting our belief in our sensations. The mental states so termed, arise out of states of certain nerves, which states convey to us the notion of real things, existing independently of us, and becoming, by their means, known to us. But there is another class of mental states, distinguished by many philosophers as *ideas*—that term being used as contrasted with *sensations*—the connection of which with affections of the nervous system may also be well proved, and which appear really to differ from sensations chiefly in the degree of vividness of the nervous action. Now it is an ascertained fact that, under the influence of disease, producing abnormal excitement of the nervous system, or some part of it, these ideas may have, to the individual experiencing them, all the force of sensations, so that he receives them as such, or, in other words, believes in the reality of what is thus brought before his mind. It is from other persons in full health being in a position to receive the same sensations, and not receiving them, or from their comparison with facts well known to great numbers, that we are assured that what the individual supposes himself to perceive has no reality, and that he is under the influence of disease, which may amount to madness, or may be only partial, connected with disorder of a particular organ, and of such kind that the patient, though believing in the false sensations for the moment, can convince himself of their real nature, and correct, by his judgment, the delusion to which he has been subject. There is also another class of deceptions, usually regarded as deceptions of the senses, but really consisting in so strong an association of certain ideas with actual sensations, that we are apt to consider the whole mixed cluster as one kind, and receive the whole with the belief which belongs to the sensation. Deceptions of this kind chiefly occur when the sensations are, from some cause, obscure or imperfect, and when the mind is under the influence of some strong emotion. How many ghost stories, that seem to be plausibly supported, may be well explained by separating with care what might easily have been perceived by the senses from the mode of accounting for such sensations, suggested to the mind when under the excitement of fear, sorrow, or enthusiastic feeling, and, in such circumstances, confounded with actual sensations, so as to appear to the memory of the same nature with them.

When these mistakes from ideas associated with our sensations are not intensified by strong emotion, they are easily corrected by the judgment, even in opposition to the feeling of the moment, so that we have no permanent false belief; as when the crossed fingers touching a smooth spherical substance have, from associations respecting the parts usually affected by one or by two distinct objects, the sensation as of two, though we are certain of the fact that there is but one; or, when the revolving circle of card seems to present to our vision a bird in a cage, or a tree in its summer foliage, though we are well aware that the image of the bird and the foliage is at one side, that of the cage and of the naked branches on the other, the combination depending on the rapid motion. The real cases of deception are only where a sensation occurs unexpectedly, under circumstances fitted to awaken some emotion, under the influence of which associated ideas are intensified so as to seem parts of what is perceived by the senses. In all cases when we view the subject philosophically, it is necessary cautiously to separate the actual sensations we receive from objects from the ideas excited in connection with them, and which are easily confounded with them. In such instances we do not really receive false or unreliable sensations, but only obscure ones, which the mind completes by its own associations; just as in dreams, the noise or touch which awakens us will, before it completes that work, suggest to the fancy means of accounting for it, which pass like scenes before our mental vision.

A little calmness and collectedness of mind, with the attempt to place ourselves in a more favourable position for observation, or to apply a second sense in aid of our inquiries, would save us from chances of being deceived, which weak fear or a reproachful conscience multiply. It appears plainly, from what has been said, that, in all ordinary cases, we are not liable to be deceived by our senses. We have sensations, and to have them is to believe them. Disease and peculiar excitement may, occasionally, create difficulties; but, as a rule, where sense is concerned, no evidence beyond its own action is needed or could add to its force.

Remembered sensations differ very little from present sensations in respect to the nature of our belief in them. Past events which passed immediately in our own view, and directly affected ourselves or those in whom we were interested, especially supposing them to have been of such a character as at the time to produce a vivid impression, are frequently revived as ideas in our minds, in such a manner as to have a distinct place in a series of ideas forming our consciousness of the past. In such a case we cannot have the ideas without belief in the occurrence of the events. The memory is revived consciousness, and its existence constitutes our belief. It is true that although the kind of confidence we have in our remembrances is the same as we have in our sensations, i e., their forming a part of our actual consciousness, yet the degree differs because, whilst it is very rarely that there can be any pretence for questioning our sensations, the gradual fading away of remembrances, and the degree in which other mental states may become associated with them so as to alter their character, obliges us to make certain allowances, and in some instances to assure ourselves of the correctness of memory by the conjunction of two or more remembrances, or by other independent means. The precautions necessary in this way need not be discussed at present.

We proceed then to the consideration of the nature and grounds of our belief in states or changes of external objects not falling within the range of our own senses. These can become known to us only by having been perceived by the senses of our fellow-creatures and communicated to us by the instrumentality of language—that is to say, they are known to us by testimony, and we have to inquire why we believe testimony ; whether such belief is reasonable, and if so what limits ought to be placed to it, or what cautions are needed to prevent our being misled. The full consideration of these subjects would require a large treatise, but the guiding principles are not very difficult to indicate and will answer the purpose of our present inquiry. Other men, like ourselves, believe in their own sensations, and cannot help believing in them, nor does any doubt affect them which would not equally affect our sensations, respecting which we cannot admit doubt. If, then, we could be sure in each case of having communicated to us the sensations experienced by fellow-men and nothing more, the sources of error would be limited indeed, and we might place an almost implicit reliance upon testimony. Why, then, do we not do so? Why do we believe at all if not to the fullest extent? What are the principles which should reasonably guide us on the subject, since universal scepticism would be manifest folly and would stop all the pursuits of life, and to believe or reject according to momentary fancy would be quite as unjustifiable? Some tell us that we believe in testimony by instinct, and learn to modify and regulate our belief by experience. I cannot think the use of the term instinct proper in such a connection, but it seems to be true that our first tendency is to believe testimony and not less so that experience wisely used regulates without destroying this belief. The primary and natural purpose of language is to communicate our states of mind to others, making known our wants and desires, our hopes and fears, and as it were transferring to them our sensations and thoughts, either through sympathy or as affording reasons for their acting according to our wishes. Where there is no strong purpose to the contrary, we speak truth naturally, and because our own words are intended to convey our perceptions, feelings and desires, and we all hear from others a great deal more truth than falsehood we are as naturally disposed to believe: but because where there is no moral control in the mind, selfishness would dispose to falsehood, and we all find ourselves occasionally deceived; a certain amount of distrust is gradually created by observation of what passes around us. There are also other sources of difficulty: testimony ordinarily communicates, not single sensations or definite clusters of them, which would leave little room for doubt or confusion in the mind of the witness, but series of successive events which were hastily viewed from one point of view and which would be rendered obscure either by his indifference or his agitation of mind; frequently too sufficient time has elapsed to admit of a partial fading of the events from the memory, whilst in an attempt to recall them, supposing no intention to deceive, desire and emotion would modify the result, giving colour to the narration. We may easily observe in our own minds the difference there is in clearness of revival between a single sensation or contemporaneous group, or even the various sensations combined in any single scene, and a series of occurrences and changes with various actors and perhaps various causes of excitement; and we know that when called upon to express the whole in words, we might well, in the latter case, vary our account on different occasions in the minor particulars, though entirely free from fraudulent intentions. Inaccurate habits of observation, and the want of sufficient command of language to express well what is in their minds, greatly increase the danger, in ordinary cases, of conveying false impressions. Such then are the sources of the uncertainty of testimony. Men do not always desire to communicate their real sensations, interest and passion often exciting them to wilful deception, without moral feeling offering any efficient check; and where there is no fraud, confusion of ideas, indifference on the subject, want of good observing power, want of clearness of language, and the colouring influence of prejudice, passion and desire, distort the narrative so as to render it essentially deceptive. Against all these causes of error we have to be upon our guard; and if, as often happens, testimony reaches us only through a chain of witnesses, each step in the transmission increases the danger of some mistake, so that the value of such evidence is perpetually deteriorating. But we must recollect that *recorded* testimony, though it may require evidence as to the reliability of the record, is subject to no such deterioration as has been referred to, and on the other hand, it very often happens that the same scenes and series of events are witnessed by several different individuals whose separate recollections we can obtain, and as the chances are almost inconceivably great against mere inventors agreeing in the same narrative or any principal part of it, the concurrence of independent witnesses, *i.e.*, of such as cannot be supposed to have agreed together respecting what they should say, produces an amount of confidence nearly equalling what belongs to our own sensations and approaching very near to certainty. In fact the consistent narrative of a disinterested, and still more of a sacrificing witness, supported as to main facts by other independent witnesses, produces a confidence in which we are conscious of no deficiency, and which is fully equal to what is needed for any practical purpose, whilst any record of alleged facts containing no inconsistency in itself, or with what is well ascertained by other means, and no strange improbability or incompatibility with the ordinary course of nature, is reasonably received as true, unless some special ground for doubt, founded on the character or purpose of the narrator, can be established. The question, how great a weight of that improbability which arises from inconsistency with the ordinary course of nature, good testimony will counterbalance, need not be discussed here, but the rule may be laid down that everything which is not contradictory and, in the strict sense of the word, absurd, may be established by sufficient testimony; and it is evident that the kind of reasoning employed by sceptics against the facts which are the foundation of religious faith, would destroy all belief in either distant scenes or past events, and thus both limit our pleasures and confine within the narrowest limits the sources of useful knowledge. Testimony may often be so imperfect as not to create belief in what is antecedently probable. It may also be good enough to compel our belief of any thing not absolutely impossible, however opposed to natural probability. The weighing of it is a most important operation to be carried on according to well considered rules and often demanding a clear and practical judgment, but it deserves notice that the cases which form the subject of judicial investigations are just those which afford the greatest opportunities and inducements to falsehood, and we should be wrong if we judged of human nature by a standard formed from the experience of the courts.

I proceed next to the consideration of our belief in consequences following their known antecedents, or in the relation of cause and effect. This is continually spoken of as involving something very mysterious, and many think that it can only be explained as an instinct, or a primary essential principle of our nature. It includes the notion of *power*, which, indeed, is only an abstraction of what is common to the many cases of cause and effect which are continually under our notice. If there are uniform laws of Nature, that is, if the Author of nature governs the universe according to a plan founded on Wisdom and Benevolence, not leaving the course of events to accident or unceasing change, then this existence of Law implies and renders necessary that antecedents really the same should have the same consequents. The ultimate cause is supreme and infinitely powerful intelligence, acting on a perfect plan with a view to a result. The regularity which prevails is what ought to be expected under such control. Its action on our minds in producing firm expectation or belief when the known antecedent occurs that the consequent will follow, is, in my view, quite intelligible. States of the mind depend on states of the brain, and it is a grand general law that simultaneous or immediately successive states become sympathetically connected; so that the recurrence of the one, whether as a sensation or its corresponding idea, brings up the idea or thought of the other, the connection becoming stronger and more certain by every repetition. Accordingly, when certain changes have recurred again and again, the one following the other, the presence of the antecedent uniformly suggests the idea of the consequent, and this thought of it as about to come constitutes our belief or expectation. Every observed case of uniform sequence has the same character, and generalizing, we obtain the ideas of the relation of cause and effect and of power in the antecedent to produce the consequent—this latter abstraction being only our feeling of the certainty with which the consequent follows. The whole is a case of invariable association creating irresistible and steady expectation. When we reason backwards from the effect to the necessity of a cause, we only apply to a partially known particular case a general law derived from all known cases. It has been maintained that, according to this view, the necessity for a cause exists only in our minds, not in the nature of things, and, however strongly felt by us, has no real existence. The reply is, that philosophy knows of no greater force of conviction than invariable association of certain ideas, and that where the laws of our nature compel belief it is madness to demand different or stronger grounds for it. The very simplicity of the cause of our belief in effects following their causes, is what has given occasion to its being described as *instinctive,* and it is so truly, if that term be assumed to mean only that it is an invariable result of our nature. In this case there is no act or state of belief different from the presence of an idea which is raised according to a uniform law.

I pass to the investigation of belief in a scientific generalization. This is a sort of proposition affirming some definite relation between the objects or ideas expressed by or contained in the subject, and the objects, qualities, or ideas included in the predicate. It can have no meaning if the proper extent and limits of the terms be not clearly understood. This being so, it contains an intelligible proposition, and the question arises: Why we believe it? The case is one in which a great many believe on authority merely. Science offers its truths for the guidance of practical men, who receive them as coming from those who know, and as being established to the satisfaction of competent judges, before being put forth for their instruction. But what we require now to know is, in what consists the belief, and how was it caused of those who first delivered them to the world as truths, and of all those inquirers who accept them as such from knowledge of the evidence. To say that they are truths, is to say that, taking any particular case of an object or idea, properly included as one of those to which the term forming the subject is applied, it would be found to possess the qualities, or, in certain circumstances, to pass through the changes, or otherwise to manifest the relations expressed by the predicate. Now it is clear that, if the general proposition were founded on the actual personal experience by our own sensations of every possible case coming under it, so that each instance of the application of the general statement must be one, or the exact copy of one of the instances upon which it was founded, then general truths must be of comparatively narrow application and limited use in economising labour or extending knowledge. Their great value consists in the general proposition, rule, or natural law covering a much greater number of cases than have been actually examined or perceived by the senses, and yet deserving our confidence. We assume, as sufficiently established by every one's experience, that what is found to be true in one instance will be true in all similar instances; that is, we assume the uniformity of the laws of nature, consequently that it is only necessary to show that a certain proposition expresses a natural law, in order that it may be confidently applied to every single case really falling within the rule. But the assertion of the uniformity of the laws of nature is only giving the form of a general proposition to the feeling of the mind, resulting from various and continued observation. We know nothing of laws of nature, as separately existing powers, exerting any controlling force; but we recognise them as expressions of the regularity with which effects are seen to follow causes, and, finding this regularity to prevail to such an extent in respect to cases of very different kinds, we are prepared not only to admit separately different laws as making part of the government of the world, but to adopt the general principle that the universe is regulated by constant laws, the knowledge of which is the best guide, on all matters to which they apply, for those who dwell in it: and this confidence in uniformity enables us, from a few good observations, to lay down a rule as to what may always be expected. Where the proposition expresses what will happen to a given substance in certain given circumstances, a single good observation might establish a law. Where it expresses relations of a class of objects, a number of examples may be necessary, and certain precautions are required, to avoid rash and misleading generalization; but, when we have once reached a law, we apply it with confidence to all cases really coming within its terms, because we have established in our minds a general expectation of the uniformity of natural laws, which is really the same mental state as our expectation of effects from causes, and is explained in the same manner.

Belief in opinions philosophical, moral, religious, political, or relating to personal character, has the same nature as our belief in the generalizations of physical science. The opinion is the verbal expression of a generalization of the mind. It implies that, on these subjects, there are real uniform relations of things, which may be known, and which we consider that we know; but the fact that the opinions of mankind on these subjects vary to such a degree, as they are known to do, shews either that the inductive process is less carefully performed, owing to the subjects of examination not being objects of sense, or that passion and prejudice interfere much more with our conclusions than they can well do in generalizations which relate to the laws of external nature. These difficulties affect real enquirers, but the proportion is very large indeed of those who, in such matters, only accept the instructions of others, and whose opinions, early received from those whom they deem sufficient anthorities, and impressed by repetition and the force of example, become so associated with all their trains of thought as to be firmly fixed independently of evidence. Hence the strongly marked differences which prevail on all these matters of opinion, and the certainty that they can only be removed when those who try to form an independent judgment carry on their inquiries by the same methods as would be employed in physical science, and when the proportion of those who have really examined and endeavoured to appreciate evidence is far greater than it is at present.

Every opinion tends to excite or restrain some action. If the opinion be true—that is, if it be the expression of the real mode of existence and relations of the objects or ideas to which it refers, and the real regular consequents of certain known antecedents—it leads us to act with due regard to these relations, and thus to guide our conduct so as to attain to well-being, whilst a false opinion necessarily tends to produce uneasy thoughts, unwise conclusions, or disappointing and unhappy results. Truth is as much a reality which man may reasonably hope to obtain in what are called matters of opinion, as in questions of physical science, and no wise man is blind to its importance; but associated feeling, prejudice, habit, interest, act so powerfully, though often indirectly, and unperceived by the individual, that the right decision on questions of the kind under consideration, important as it is, must unavoidably be more slow of attainment than where we can appeal directly to the senses. The kind of evidence available and the proper tests of truth on questions religious, moral, metaphysical, political and social are subjects of vast importance and universal interest, but their discussion would lead me far beyond the bounds I must prescribe to myself. The general principle is clear. Every opinion is the expression of a generalization, implying the sufficient knowledge of a number of particulars. It rests on observation or acquaintance with facts directly or indirectly obtained. It is vitiated by assuming as facts what are not so, or by insufficient or wrongly conducted induction. Freedom of opinion means the right of every individual to decide doubtful questions for himself by such means as to him appear best, an inalienable right of human beings, and the full recognition of which is the best means of securing the ultimate prevalence of truth, and of the good which attends it, but this recognition is not for a moment to be supposed to imply indifference to truth in the possession of which consists the highest good and highest happiness of man, and the promotion of which is one of the noblest objects of philanthropy.

It remains for me to speak of the nature of our belief in mathematical propositions. There is manifestly some great difference in kind between this belief and that which we have in our sensations, or in any generalisations respecting the changes or relations of objects or ideas. Belief in a mathematical proposition is not merely confidence but absolute certainty of a kind unattainable in other subjects of thought and involving the absurdity of believing otherwise. This peculiarity of mathematical propositions seems to depend on their being concerned wtth a limited class of ideas, and with them not as they may be obtained by our senses, but as pure abstractions of the mind. We separate number and the forms of extension from the objects, by means of which alone we could first acquire these ideas. We define the fundamental ideas in terms which exclude the real and physical, leaving us a pure abstraction. In this we do nothing really different from what is done in some of the commonest proceedings of language. The name of a colour implies a coloured object as much as extension in one or more directions implies something extended, but we can think and speak of the colour without any reference to the object, as we can of a line or surface without concerning ourselves with extended substance. The abstraction and the absence of a real matter of fact separation of the abstract ideas are the same in both instances, but in the latter it relates to a class of ideas (those of number and magnitude) specially fitted for the exercise upon them of our powers, and furnishing an endless variety of results. Having laid down our definitions, we consider and logically develope the necessary relations of the ideas submitted to us, so as to form a chain of inferences all implicitly contained in those definitions. To believe one of these propositions is to perceive its logical connection with those preceding it up to the commencement, and its necessarily arising from the definitions. If we are asked whether we really understand and believe the definitions themselves we reply that although physically we cannot separate position from magnitude or linear extension from the body extended, yet the mind can consider the one without the other, and we understand the definition as indicating that in the studies we are engaging in, we have no concern with what is physical and material, but are keeping in view one class of qualities or attributes so as from the required series of definitions to elicit a chain of absolute but abstract truths, having a most important bearing on realities though founded on assumptions impossible in fact. The very nature of mathematical reasoning shows the mistake of supposing that any similar proof is attainable in any case unless where we can begin by defining certain ideas in the abstract, and then unfold their relations with no other assumptions, but such as must necessarily be admitted as soon as understood by all human minds. Whether these conditions can be found in any science besides logic and mathematics may be doubted, certainly the method of demonstration is exceedingly limited in the subjects to which it can be applied. Want of attention to this truth has been betrayed by a vain attempt to give the forms of demonstrative proof to subjects which do not admit of the reality, and by a most unreasonable demand for mathematical certainty in the case of questions involving matters of fact or relating to religion, morals and other such subjects which have their own proper evidence, by the right application of which alone they can be judged. Even setting aside the strictness which is required in the sciences of number and magnitude, ratiocination or the deductive process is by no means the only or principal means of attaining truth. It is necessary to man as an employer of language with its generalisation and abstractions, and it is most important both in excluding a large class of errors, limiting greatly the abuses to which language is liable, and in presenting truths in various aspects, leading to fresh applications of them, and exhibiting them in all possible forms; but other methods must be employed for a real extension of the bounds of human knowledge, and, admirable as logic may be as one mode of exercise of the powers of the mind, under due discipline, its merits must not be exaggerated, for, after all, the perceiving clearly and certainly as a necessary truth, that what is meant by one set of words arranged as a proposition is already implied in other propositions, the truth of which is admitted, is not to be accounted among the greatest achievements of human intellect. The belief produced is, that certain words express a real relation of the ideas conveyed by them, which relation must first have become known by observation or induction, and can only by reasoning be combined with other admitted truths and set in various lights. Mathematics has the advantage of its foundation in definitions, which secure its abstract character, and of the wonderful variety of the relations which its subjects, number, and the forms of magnitude admit. It is a wonderful science equally admirable in its results, and in the high exercise it affords to several most important faculties; yet it is possible for it to be too highly valued, and there is no inconsiderable danger of its peculiar methods leading the mind astray in other inquiries.

In all that I have said of the kinds and grounds of belief I have not yet found it necessary to name intuition, and I am myself strongly persuaded that the mind is incapable of reaching to any truth within itself, and entirely independently of what comes from without, the simplest and most universally admitted truths being believed from early constant and universal experience. An *axiom* is only the verbal expression of some relation which experience compels us all to know, so that as soon as we understand the terms we admit the truth. If any proof is required, the assertion cannot be called an axiom. It was once thought by many philosophers that mathematical science was built upon axioms—such an error now needs no refutation—the axioms are laid down as a caution against assuming in our reasoning any thing beyond them, in addition to what has been already proved, but the fundamental principles are contained in the definitions.

We have now reviewed the various states to which the word *belief* is applied as a common name. They all consist either in the presence in the mind of sensations or remembrances, the mere existence of which constitutes the belief; in invariable association of two or more sensations or ideas, causing the presence of the one to suggest the other as about to arise, which constitutes the expectation of it or belief that it will come; or in the knowledge of certain conditions or relations of things; or of the meaning and proper limits of certain terms introduced into the mind by means which we call *evidence.* There can be no evidence afforded or needed of the truth of a sensation, or of a belief in a succession of associated ideas; but where the perceptions of others are communicated by testimony, where general conclusions arise from multiplied observations, or where deductive reasoning unfolds relations not before perceived, the belief is produced by means, which means constitute evidence, and certain rules and precautions are laid down for its regulation, constituting the laws of evidence, which must be correct generalizations of observed facts respecting the means of securing truth in the classes of cases here referred to.

Truth is the expression of the real condition and relation of things. The term is used ethically for the conformity of our words to our belief, but the two senses must be carefully distinguished. Truth is something real, not variable according to individual judgments or feelings, but existing in the nature of things. Without all doubt much of it has been, and, by persevering efforts, much more may be obtained. It is, on all possible subjects, the proper and only safe guide for human conduct. To deny its usefulness is about as reasonable as to reject either light or guidance in passing at night through an unknown wilderness, abounding in quagmires, chasms, and water channels. We are furnished with faculties for its attainment, and to employ them well, so as to benefit ourselves and others, is the glory and happiness of our nature.

NOCTURNAL LEPIDOPTERA FOUND IN CANADA.

PART II. HOMOPTERIDÆ.

BY REV. CHARLES J. S. BETHUNE, M.A.
SECRETARY TO THE ENTOMOLOGICAL SOCIETY OF CANADA.

In a former number of the *Canadian Journal* (vol. viii. 1–16, Feb., 1863) descriptions of all the then known species of the genus Catocala found in Canada and the neighbouring States, were published with a view to assist collectors in naming their species, and to furnish at the same time a contribution to Professor Hincks' contemplated "Fauna Canadensis." A valuable Synopsis of Canadian Arctiadæ, by Mr. William Saunders, has since been published (vol. viii. 349-377, Sept., 1863) in furtherance of the same objects. The following descriptions of new and previously known species of another family of moths (Homopteridæ) are now offered as a further contribution, small though it be, to our limited stock of information respecting the insects of this country.

QUADRIFIDÆ—EXTENSÆ.

The section *Extensæ* of the group *Quadrifidæ*, to which many of our handsomest night-flying moths belong, is divided by M. Guénée into three families, one of which, Polydesmidæ, is not represented in America; of another, Hypogrammidæ, only two species are found in the Southern States, but none in Canada; of the remaining family, Homopteridæ, which I now propose to consider, a goodly number of species are found in this country.

HOMOPTERIDÆ.—Guen.

The members of this family, in their perfect state, may be readily distinguished from all other Noctuidæ by the following characteristics:—All the wings are broad and nearly alike in colour, wood-brown or the colour of an ordinary withered leaf, and black predominating; their markings are also similar, the subterminal line forming on the anterior wings two large arcs which unite on the middle of the hind margin, and on the posterior wings one, the space thus enclosed being in several species covered with white or pale green scales. The palpi are long and ascending, with the third joint well developed and linear. The thorax is broad, with the tegulæ very large and divergent, cut squarely or hooked at the tips. The abdomen has a broad crest at the base, and fine linear ones on most of the following segments. It is divided into eight genera, of which four are represented in Canada and the United States. They may be thus distinguished:—

A. Thorax round or nearly so.
    B. Wings black. 1. Anthracia, *Hübn.*
    BB. Wings not black. 2. Phæocyma, *Hübn.*
AA. Thorax square.
    C. Subterminal line on the anterior wings forming two arcs. 3. Homoptera, *Boisd.*
    CC. Subterminal line nearly straight. 4. Ypsia, *Guén.*

Gen. 1. ANTHRACIA.—Hübn.

Antennæ, more than half the length of the body; crenulate in the male. Palpi ascending, thick, curved; third joint rather less than half the length of the second. Thorax moderately robust, convex, rather rounded; tegulæ slightly projecting. Abdomen conical, pointed posteriorly; in the male with two small linear crests on the third and fourth segments. Wings entire, of uniform colour, glossy, with long fringes.

The members of this genus may be distinguished at once from all the others by their deep glossy black wings, like ravens' plumes, and their tegulæ, which, though very hairy, do not expand so much as usual at the tips.

Larva with sixteen equal feet; smooth, cylindrical, very much attenuated posteriorly, without protuberances; head thick, lenticular. Lives on trees.

Pupa obtuse anteriorly, very acute posteriorly, without efflorescence; subterraneous.

1. A SQUAMULARIS, Drury.—*Walk.* *C. B. M., Noct.* xiii. 1075.
Coracias, Guén. *Noct.* iii. 19.

Wings glossy coal-black, tinged here and there with dun-coloured brown; anterior with several parallel and undulating dull black lines, the last one usually most distinct, and sometimes relieved by some whitish scales. Reniform spot indistinct, but followed by a group of yellowish-white scales. A terminal series of small black points with whitish tips.

Posterior wings with a brownish streak between the sub-median and fourth inferior nervures, and the costa broadly tinged with the same colour.

Under side grey, shining, with one or two indistinct lines.

Female similar above, but with the under side quite dull, and of a more reddish-grey colour, transverse line more distinct.

Alar expansion 1·4 inch. Larva on oaks.

Hab.—N. America; Georgia. In May.

2. A. Cornix, Guén.—*Noct.* iii. 19, pl. 15. Walk. *C. B. M.*, *Noct.* xiii. 1075.

Very like *A. squamularis*, from which it chiefly differs in the palpi, the third joint of which is, in this species, very short and hardly discernible, whereas it is rather long and linear in the former. The wings are more varied with brown; the marginal streaks are larger, longer, and almost confluent.

Hab.—North America.

Gen. 2. Phæocyma.—Hübn.

Antennæ long; in the male crenulate with very short cilia. Palpi vertical, rather slender; third joint long, erect, linear, obtuse. Head small; eyes in the female very small, and approximate. Thorax globose, with very divergent tegulæ. Abdomen smooth, acute, a little depressed, slightly keeled, with fine crests. Wings alike in colour, denticulated: anterior pointed at the tips, with the ordinary spots distinct; posterior with few markings.

P. lunifera, Hübn.—Guén, *Noct.* iii. 3, pl. 15. Walk, *C. B. M.*, *Noct.* xiii. 1045.

"Wings greyish testaceous. Anterior covered with small black transverse streaks; base deep brown, well defined, clouded with blackish. A similar apical spot, pointed, and black at the tip. Elbowed line well marked, fine, and undulating. Reniform spot crescent-shaped, russet yellow colour; orbicular represented by a black dot which is placed upon a large transverse space of clear grey. Posterior wings with a subterminal brown band, traces of another above, and the terminal border much streaked. Under side clearer, with a lunule, and a fine central undulating line. Female larger and a little more sombre.

Alar expansion 1·3 to 1·5 inch.

Hab.—Georgia, Florida."

Gen. 3. HOMOPTERA, Boisd.

Antennæ much more than half the length of the body: crenulate, with small bunches or whorls of hairs ranged regularly on each side of the stem in the male; in the female these hairs are simple, short and remote. Palpi vertical; second joint slightly recurved; third a little shorter, linear, flattened, slightly obtuse. Proboscis moderately long. Thorax robust, large, hairy, quadrate, with the tegulæ long, flattened, hairy, and divergent at the tips. Feet hairy in the male, the intermediate thighs very thick, and densely clothed with long hairs exteriorly. Abdomen stout, slightly flattened, with a large flat crest at the base, and very small ones on the following segments. All the wings of uniform colour, and with similar markings: the anterior straight along the costa, rounded at the tips, rather oblique and slightly convex on the exterior margin.

Larva smooth, elongate, narrowed anteriorly; head small; a bifid protuberance on the eleventh segment; sixteen feet, of which the first pair are membraneous, shorter than the rest, and unfit for progression. *Pupa* formed within a slight cocoon among leaves; obtuse anteriorly, conical and pointed posteriorly, covered with a blueish-white, or pale violet efflorescence. (*Guén*)

Most of the species of this genus are found in their perfect state during the end of May and beginning of June; some few however, do not appear till August and September. They come freely to sugar at night, and may be captured in the day time reposing on the under side of the cross-beams of fences, and in similar sheltered positions. All the species known to inhabit the extra-tropical regions of North America, not including Florida, are, with one exception, found in Canada, and no doubt others will be met with when the mode of capturing by sugar is more generally adopted by Entomologists throughout the country. Two of the new species have been thus discovered during the early part of the present season.

SYNOPSIS OF CANADIAN SPECIES.

A. Size large.
  B. Wings blackish.
    C. Wings with exterior margin paler. 1. H. calycanthata, *Smith*.
    CC. Wings with no paler margin. 2. H. nigricans, *Bethune*.
  BB. Wings more or less wood-brown colour.

D. Disk of thorax, black. { 3. H. lunata, *Drury*.
{ 4. H. involuta, *Walk.*

DD. Disk of thorax not black.

E. Wings with a white or glaucous marginal fascia.

F. Reniform spot distinct. 5. H. minerea, *Drury*.

FF. Reniform spot obsolete. 6. H. edusa, *Drury*.

EE. Wings without a white marginal fascia.

G. Anterior wings without white bands. 7. H. Saundersii, *Bethune*.

GG. Anterior wings with two white bands. 8. H. albofasciata, *Bethune*.

BBB. Wings dark cinereous. 9. H. duplicata, *Bethune*.

AA. Size small.

H. Wings ferruginous. 10. H. contracta, *Walker*.

HH. Wings whitish cinereous. 11. H. herminioides, *Walker*.

1. HOMOPTERA CALYCANTHATA, Smith. Guén. *Noct.* iii. 15. Walk. *C. B. M. Noct.* xiii. 1054.

Glossy coal-black; cinereous beneath. Antennæ brown. Tegulæ tipped with brownish. Wings deep glossy black, with a broad whitish border on the exterior margin, thickly speckled with black and brown scales. Anterior wings with the ordinary lines, fine, undulating, deep velvety-black. Reniform spot indistinctly margined with the same. A paler costal spot adjoining the exterior side of the extra-basal line, and another just before the elbowed line. The pale border forms two deep well-defined sinuses on these wings, but is not crossed by a shade in the middle, as in most of the other species. Posterior wings, with the costa as well as the exterior margin, broadly paler; the remainder of the wing deep black, without markings. Under side, with obscure lines and streaks, and a darker shade corresponding to the black part of the wings above. Length of the body, 6 in.; alar expansion, 1·6 in.

Hab. Cobourg, captured at sugar, in June. London, C. W. (Mr. Saunders). U. S.

The larva is thus described by M. Guénée:—Cinereous-grey, clouded with whitish and blackish, with the usual lines blackish; the sub-dorsal doubled, continuous, but only on the first three and last seven segments; the stigmatal surmounted by very oblique black marks. A small ochre-coloured spot between the fourth and fifth segments; these two, and also the second, third, and sixth, are sprinkled here and there with black marks, of which some have the centre white. Spots on the eleventh almost horizontal. Abbot figures it on the *Calycanthus floridus* (Carolina allspice), but it lives also on oaks. Pupa, red, without efflorescence.

2. H. NIGRICANS, Bethune. *Pro. Ent. Soc. Philada.* iv. 214.

Black, with a deep purplish-brown tinge, cinereous beneath. Thorax, black, brownish in front, where it is crossed by two narrow black lines; tegulæ also crossed by two lines composed of pale atoms, the hinder one edged with deep black. Anterior wings, deep brownish-black, darkest along the costa; the two basal lines double, black, distinct, the outer one followed by a slightly paler band; median space, brownish-black, deepened by three tolerably distinct, transverse, wavy black lines; elbowed line very distinct, undulating, narrow, and deep black, its posterior half doubled; sub-terminal line, pale fuscous, with some scattered glaucous atoms for half its length, then deep velvety-black and doubled, forming, as is usual in this genus, a large lunule; a marginal series of pale fuscous lunules, edged interiorly with a darker shade; orbicular spot denoted by a black dot; reniform, black, indistinct, with a small whitish spot on its under side.

Posterior wings, of the same general colour as the anterior, but becoming gradually paler towards the base, which is cinereous; median portion of the wings crossed by a number of dark, wavy, tolerably distinct lines, terminated by a very fine black line; terminal portion of the wing enclosed by a deep velvety-black line, a continuation of that on the anterior wings, edged with fuscous exteriorly, and followed by a blackish band, speckled with glaucous atoms, and a series of lunules as on the anterior wings.

Under side, cinereous, darker towards the exterior margin; anterior wings with a black discal dot, a faintly indicated transverse line, and a series of marginal dots between the nervures, black, edged with white; posterior wings with a black discal lunule, three very wavy black lines, the outer one almost obsolete anteriorly, and a marginal series of black white-edged dots.

Length of body, ·19 in.; alar expansion, 2·3 inches.

Hab. Toronto; in August.

3. H. LUNATA, Drury. Guén. *Noct.* iii. 19. Walk. *C. B. M.* xiii. 1053.

Wood-brown, varied with deep blue-black. Antennæ and palpi, brown. Thorax, brown, and with a black line in front, wholly black on the disk, with a few cinereous scales. Abdomen, brownish, with a black spot on the last segment. Anterior wings, wood-brown, clouded with black, darker on the costa and at the base. Extra-basal line doubled, and generally becoming lost in the costal shade; median space traversed, as far as the reniform spot, by several vague undulating brownish-black lines, which are sometimes concealed by a black cloud across the wing; remainder paler. Reniform spot, deep blue-black, well defined, often with a whitish dot adjoining it posteriorly; orbicular represented by a black dot. Elbowed line, fine, black, very undulating anteriorly, almost straight posteriorly, occasionally obsolete; subterminal line, obsolete anteriorly, posteriorly deep velvety-black, followed by a broad blue-black line, which forms a large arc, enclosing a paler black-speckled space. Subapical spot, deep black; a marginal series of black points edged exteriorly with white.

Posterior wings with a black discal dot; two or three transverse wavy dark lines; two fine velvety-black lines, followed by a similar black arc to that on the anterior wing; terminal space covered with black streaks. Under side of both wings cinereous, with indistinct discal lunules, and an infinity of obscure streaks; in some specimens with well defined transverse black lines.

Length of body, ·5 to ·7 in.; alar expansion, 1·7 to 1·9 in.

Hab. Cobourg; at sugar and in repose, during the end of May and beginning of June. London (Messrs. Saunders and Reed). Montreal (Mr. D'Urban). United States. St. Domingo.

Larva, "whitish, clouded with grey, with the vascular and the subdorsal lines blackish, interrupted. The posterior incision of the fourth segment has a large yellow spot, surmounted by two black *omicrons*. A small yellow spot in the incision of the sixth; the seventh is partly occupied by a large grey space; the first three have each a black mark instead of the stigmatal line. Feet and head of the same colour as the body; the head with some black marks also. Pupa entirely covered with a lilac or violet efflorescence. The food-plant which accompanies Abbott's figure is a *Hypericum* (St. John's Wort), but it feeds also on oak, ash, and plum trees. It forms its chrysalis between leaves."

4. H. INVOLUTA, Walk. *C. B. M. Noct.* xiii. 1055.

"Wood-brown colour, minutely speckled with black. Thorax with a slender black band in front. Fore tarsi, black, with pale bands.

Fore wings with the lines much like those of *H. lunata,* to which this species is very nearly allied, but may be distinguished by the two distinct exterior, black undulating lines; three large blackish costal patches; first and second, diffuse; third, more defined, and with some pale dots in front; a large diffuse blackish spot by the middle of the exterior margin; marginal streaks with whitish tips. Hind wings with some paler lines. *Var. B.*—Darker. Hind wings with the pale lines hardly apparent. *Var. C.*—Fore wings much paler, with the exception of the costal patches, and two irregular and incomplete blackish bands. Length of the body, 6½–7½ lines; of the wings, 18–20 lines. *Hab.* United States."

The foregoing description, by Mr. Walker, is hardly sufficiently definite to enable one to determine the species with certainty. I have in my possession two Canadian specimens, which agree pretty well with his description of *H. involuta,* but from a comparison of sixteen specimens from the United States and different parts of Canada, I am led to think that they are merely varieties of *H. lunata;* the only palpable differences being that in one the thorax is entirely brown, and in both the blue-black subterminal band is wanting on the posterior wings, though pretty well marked on the anterior.

5. H. MINEREA, Guén. *Noct.* iii. 15, pl. 18. Walk. *C. B. M. Noct.* xiii. 1054.

Ferruginous wood-colour, sometimes ochraceous, and sometimes with a purplish tinge. Thorax, brown, with a black line in front, and a black and cinereous band posteriorly. Anterior wings with the base dark-brown, crossed by some white lines, as far as the extra-basal line; then a pale transverse band, composed of cinereous, glaucous, and sometimes ochraceous scales; the remainder of the median space is almost entirely of the dark ground colour of the wing, which varies from ochraceous to ferruginous-wood colour, and sometimes deep purplish-brown. Reniform spot tolerably distinct, blackish-brown; orbicular represented by a black dot opposite the reniform. Subterminal line, black, well-defined, parallel to the elbowed for half its length posteriorly, then divergent towards the apex, forming, by means of the black shade in the middle of the exterior margin, two large arcs, which enclose white glaucous-flecked spaces. A series of black marginal streaks, and a brownish-black apical spot.

Posterior wings, with the basal portion pale, speckled with black and glaucous scales; a black discal dot; two fine black undulating lines, corresponding to those on the anterior wings, the posterior one forming a V in the cellule, and enclosing a large terminal glaucous and white space, flecked with black streaks, which are more numerous exteriorly.

Under side, brownish-cinereous, with the discal lunules generally well-defined, several more or less distinct transverse lines, and a marginal series of black dots. Length of the body, ·6 to ·7 inch.; alar expansion, 1·7 to 1·9 inch.

Hab. Cobourg; not uncommon, at the same time as *H. lunata.* Quebec (Mr. Saunders). York Mills (Dr. Cowdry).

Larva, "clear cinereous-grey, clouded with white in places, with the ordinary lines festooned and interrupted, and the points blackish. Between the fourth and fifth segments there is a large citron-yellow spot; in the anterior part of the fourth and seventh a blackish spot, marked with white dots. Dots on the eleventh, blackish, with a lateral mark of the same colour. Head and feet of uniform colour with the rest of the body. On oak and iron-wood. Pupa covered with violet dust."

6. H. EDUSA, Drury. Guén. *Noct.* iii. 14. Walk. *C. B. M. Noct.* xiii. 1054. *Putrescens,* Guér. *Regne Animal.*

Wood-brown. Thorax with a black band in front, and some black and cinereous scales behind; tegulæ hooked at the tip. Wings, wood-brown, slightly clouded, and streaked with darker; anterior with an ill-defined greenish-white fascia, including a black discal dot after the extra basal-line; a white point on the inferior side of the reniform spot, which is obsolete; elbowed line, black, very wavy, indistinct; subterminal, deep black, well-defined posteriorly, and forming two large greyish or blueish-white lunules; a terminal series of thick brown spots, often confluent. Posterior wings with some indistinct lines across the middle; a deep velvety-black line, corresponding to the subterminal on the anterior wings, and forming a similar large blueish-white lunule, followed by a similar series of marginal spots. Under side, cinereous-grey, with discal lunules, and some indistinct lines. Length of body, ·8 inch.; alar expansion, 2·2 inch.

Hab. Cobourg, in September. United States.

Larva, "flesh-colour, with all the lines interrupted, festooned, blackish; the trapezoidal and lateral of the same colour, as well as the two spots on the eleventh segment; between the fourth and fifth segments there is a large orange spot, and upon the back of the fourth two blackish circles, which include the trapezoidal. Head and feet of the same colour. On the '*Verge d'or,*' and, probably, on oak; turns towards the middle of September; probably double-brooded. Pupa entirely covered with a blueish efflorescence."—(*Guén.*)

7. H. SAUNDERSII, Bethune.—*Proc. Ent. Soc. Philada.* iv. 215.

Brown wood-colour, brownish-cinereous beneath. Thorax with a narrow black line in front; tegulæ with alternate black and whitish bands. Abdomen brown wood-colour (or the colour of an ordinary dead leaf). Anterior wings of the same general colour; basal portion dark brown, with the usual lines whitish, margined with black; median space paler, yellowish posteriorly, with a pale band proceeding from the costa half-way across the wing, composed of whitish atoms and enclosing a black discal dot, then two zigzag brown lines, well defined anteriorly, touching the reniform spot, which is black and tolerably distinct, the remainder of the median space brownish with a few dark scales scattered over it; elbowed line fine, very undulating, distinct, deep black, edged exteriorly with pale brown; subterminal line wavy, bluish-white, with its outer edge black; a black apical streak, and another in the middle of the exterior margin; a marginal series of tiny brown lunules.

Posterior wings cinereous-brown; basal portion with no markings except a small black discal spot; median space occupied by five transverse dark slightly wavy lines, the outer one black and very fine; terminal portion enclosed by a black velvety line, edged with yellow exteriorly, followed by a bluish-white line in a black shade, the large lunule thus formed is covered with minute flecks of black; a marginal series of lunules as on the anterior wings.

Under side of both wings brownish-cinereous; with a black discal lunule, preceded by a black dot in the anterior wings, a transverse wavy black line, and a marginal series of black dots; posterior wings with an exterior transverse line also, which is almost obsolete until it approaches the anal angle.

Length of body, .80 inch. Alar exp. 2 inches.

Hab.—London, C.W. (Coll. Mr. Wm. Saunders.)

8. H. ALBO-FASCIATA, nov. sp.

Whitish, streaked and speckled with brown. Thorax brown, with an imperfect black band in front, and some cinereous scales posteriorly. Abdomen white, with a few black scales; the basal tuft brown, and a small black spot at the tip. Anterior wings streaked and spotted with black and brown as far as the extra basal line, which is thick, brown, and irregular, and is followed by a white fascia, enclosing a rather large black discal dot; median space streaked and clouded with brown; reniform spot blackish-brown; elbowed and subterminal lines fine, doubled, parallel, and well-defined posteriorly, but losing themselves anteriorly in a dark costal patch; the elbowed thickened into a black spot opposite the reniform; immediately succeeding the subterminal, a pure white slightly wavy fascia running across both wings, and followed by a brownish-black parallel band; a series of black marginal dots on a paler space.

Posterior wings whitish, with a small discal dot, a few indistinct transverse lines, and a well-defined brown black-edged line corresponding to the sub-terminal on the anterior wings; the marginal dots rendered obscure by a number of black and brown streaks. Under side whitish-cinereous, with discal lunules, a dark transverse line, a marginal series of black dots, and a second discal spot on the anterior wings. Length of body, .6 inch; alar expansion, 1.75 inch.

Hab.—Cobourg; May and June, at sugar.

This species bears a considerable resemblance to *H. minerea*, but may be distinguished by its much paler colour, and the sub-marginal white fascia and black band, instead of the two large terminal glaucous-white lunules.

9. H. DUPLICATA, nov. sp.

Blackish-cinereous, male darker; female clouded with tawny or ferruginous. Thorax with a fine black band in front; tegulæ tipped with ferruginous. Anterior wings with all the lines distinct, black; extra-basal with a sharp denticulation just below the costa, then slightly sinuous; elbowed, with two nearly rectangular denticulations anteriorly, irregularly curved posteriorly; subterminal forming two regular arcs which unite in the middle in a sharp denticulation. Across the middle of the median space, which is slightly paler than the rest of the wing, there is an irregular dark band edged with black, and enclosing the deep black reniform spot (in some specimens this band is almost obsolete, and in the male quite so). Marginal space paler, covered with numerous black dots and streaks, but not divided by the usual shade in thr middle.

Posterior wings cinereous, with a dark brown black-edged submarginal band commencing at the anal angle, where it is elbowed, thence straight across the wing, but becoming obsolete before it reaches the costa; faint traces of another above. Under side of both wings cinereous, with discal lunules, and two tolerably distinct transverse black lines. Length of body, .5 to .6 inch; alar expansion, 1.6 inch.

Hab.—Cobourg; beginning of June. Toronto (Dr. Sangster). London (Mr. Reed).

10. H. CONTRACTA, Walk—*Can. Nat. and Geol.* v. 258. (August, 1860.)

"*Female.* Ferruginous-brown, cinereous beneath. Palpi curved, slender, obliquely ascending, rising higher than the head; third joint lanceolate, about half the length of the second. Wings with black undulating lines; interior line double, the intervening space partly black; middle line dentate, much dilated on the costa; exterior line pale-bordered; marginal points black. Fore-wings with two basal lines. Length of the body, 4 lines; of the wings, 11 lines."

Hab.—Montreal, (Mr. D'Urban). Middle of July.

11. H. HERMINIOIDES, Walk.—*Can. Nat. and Geol.* v. 259.

"*Female.* Whitish-cinereous, slender. Palpi very slender, rising higher than the vertex; third joint lanceolate, full half the length of the second. Wings with four zigzag lines; interior and exterior lines black, much more distinct than the other two which are cinereous; fringes with blackish points. Fore-wings with black orbicular and reniform marks, the former small, the latter large, full. Length of the body 4 lines; of the wings 10 lines."

Hab.—Montreal, (Mr. D'Urban). July.

12. H. OBLIQUA, Guén.—*Noct.* iii. 16., pl. 15.

Wings very little denticulated, slightly reddish-cinereous, clear, clouded here and there with whitish. A thick spot of ferruginous-red in the place of the reniform. Subterminal line fine, sinuous, well-defined only in the inferior half of the wing, and preceded by a line still more fine and vague. On the inferior wing a similar broad line, curved, with an exterior narrow border of a clear colour; these lines are ferruginous-red. Some black atoms on the terminal space. Under side very clear reddish-grey, without markings. Palpi slender. Feet almost smooth. Alar exp. 1·6 inch.

Hab.—North America.

A supposed variety of this species, from Canada, is thus described by Mr. Walker, (*C. B. M. Noct.* xiii. 1054) :—"*H. obliqua*, var.? Wood-colour; thorax varied with fuscous, and with an anterior black fascia; wings fuscous, partly wood-colour; the margin of the reniform spot black; the transverse oblique undulating lines also black. Anterior wings with a broad interrupted pale fawn-colour marginal fascia.

Hab.—Orillia, (Mr. Bush)."

The following species is found in the United States, and many occur in Canada:—

13. H. LINEOSA, Walk.—*C. B. M. Noct.* xiii. 1056.

"*Male.* Fawn-colour, cinereous beneath. Thorax with a black band in front, and with a black mark on each of the tegulæ. Abdomen cinereous. Fore-wings with alternate oblique black and pale fawn-coloured bands from the base to beyond the middle, from whence to the tips the pale hue is only interrupted by slender parallel undulating bands, which enclose between them a black glaucous-flecked costal patch; a row of black marginal dots. Hind wings much like the fore wings, but wholly pale towards the base, and with a slight exterior glaucous band. Length of the body 7 lines; of the wings 20 lines.

Hab.—United States."

Gen. 4. YPSIA, Guén.

Body stout. Antennæ more than half the length of the body. Palpi ascending, compressed; third joint rather less than half the length of the second, obtuse, cylindrical. Proboscis moderate. Thorax quadrate, with hairy tegulæ, divergent at the tips. Antennæ and abdomen as in *Homoptera*. Wings rather broad, slightly denticulated: anterior almost rectangular at the tips, with the subterminal line continuous, and not forming two arcs.

Larva elongate, moniliform, without protuberances; feet all equal; head rather robust. Pupa not efflorescent.

1. Y. ÆRUGINOSA, Guén.—*Noct.* iii. 17. pl. 18. Walk. *C. B. M., Noct.* xiii. 1074.

Wings deep blackish-brown, with a common reddish-gray or clear violet ambiguous band, traversed by three lines, of which the intermediate is most marked and blackest. Extrabasal slightly marked, and followed by a band of clear green atoms, marked by a black dot in the cell. A group of similar atoms instead of the ordinary spots, the middle one of which is sometimes marked by a black dot. Terminal space of the same general colour as the rest of the wing, but thickly powdered with the green atoms; a series of black dots before the fringe. Under side dirty grey, covered with brown atoms, with a discal lunule and some traces of brown lines; a black point near the anal angle. Thorax, palpi, and abdomen concolorous.

Alar expansion 1·75 inch.

Larva "entirely clear green without any markings; head tolerably thick, of the same colour; feet slightly yellowish-green. It has no protuberances; and all its ventral feet (as is characteristic of this genus) are equal and moderately long. On 'swamp dog-wood.' Pupa obtuse anteriorly, with the abdomen very conical and ending in a fine point; clear red, without any efflorescence.

Hab.—North America. In April.

2. Y. UNDULARIS, Drury.—Guén, *Noct.* iii 18. Walk, *C. B. M.*, *Noct.* xiii. 1074.

Wings coal-black, with a great number of undulating lines as far as the subterminal, and of streaks on the terminal space, all very dull black; subterminal moderately thick, swollen at both ends, and interrupted opposite the cell by three white spots sullied with brown scales; reniform spot formed by some black lines, twisted, open at both ends. Posterior wings with a black line which forms a continuation of the subterminal, relieved below by some white atoms, and surmounted by another much finer line.

Under side of both wings clear testaceous-brown, with a multitude of blackish streaks and scales, but without any definite markings; a line on the hind wing indicated, however, near the anal angle, where it is relieved by a little white. Palpi black, with white tips. Alar expansion 1·75 inch.

Hab.—North America. New York.

REVIEWS.

CANADIAN CANALS*.

Notwithstanding the slight encouragement given by the Province generally to works of Canadian authorship, it is gratifying to record the issue, within the last few years, of several Canadian works of undoubted and acknowledged merit. Amongst these, Mr. Kingsford's recent book on our Canals, published at so opportune a moment, may fairly claim its place. Impartially and honestly written, filled with facts and data laboriously collected and carefully put together, and containing many well-timed suggestions for future action, based on past errors and present exigencies, it cannot fail, we think, to win for itself a wide and favorable reception. Apart, moreover, from its special merits, it is the only book to which we can turn for any connected information respecting this branch of the internal economy of the country.

The subject of our canal policy is one of such paramount importance in the present state of our commercial and political relations with the mother country and the United States, whilst, at the same time, so little attention has been bestowed upon it by general readers, that we propose, in this notice, to offer a brief analysis of its principal facts and bearings, as set forth in the very lucid exposition contained in Mr. Kingsford's work.

Undoubtedly, the most salient feature in the geography of Canada is the immense extent of the St. Lawrence River, with its connected series of lakes, all forming part of one vast system of inland navigation, without its parallel in any other part of the world. Were it not for a few natural obstacles—comprising, chiefly, the flats of St. Clair, the Falls and other obstructions of the Niagara River, and the shallows and rapids of various parts of the St. Lawrence proper—the entire line of the more habitable frontier of the Province would be practically one unbroken seaboard. Ships of heavy tonnage, in place of being arrested at Quebec and Montreal, might continue their western course for another thousand miles; and, returning to the shores of Europe, carry back a direct freight, untouched and undisturbed, from the rich metallic deposits and teeming granaries of the West*. If this condition of things could be realized—if Kingston, Toronto, Hamilton, and the other cities of our western lakes, could be thus placed, as it were, upon the actual seaboard—it is impossible not to admit that an extraordinary impulse would be imparted to them, commercially and generally, superinducing a rate of progress hitherto, as regards western Canada, entirely unknown. The attempt to produce this state of things, by the deepening of shallow places, and the construction of canals at various points, has indeed been made; but the work has stopped far short of actual fulfilment. This has arisen from no inherent difficulties, such as would render the scheme impossible, but from a variety of accidental causes, some no longer existing, and none possessing any actual power to arrest the work, if western voices persistently and collectively demand its accomplishment. Failure has occurred hitherto, in many instances at least, from early errors and mismanagement in the construction and supervision of the canals and other engineering works resorted to for the purpose of overcoming the natural obstacles to our inland navigation; and more especially from the now self-evident fact that the original promoters of these works failed to foresee, or to make provision for, the ultimate requirements of the Province. To these causes must be added the general apathy of the west in reference to all but local interests; the changed current of ideas occasioned for a time by the rise of our railway system; and, above all, the active, uncompromising jealousy of eastern cities, bent upon retaining, as long as possible, the special advantages which they now enjoy.

---

* The Canadian Canals: their History and Cost; with an Inquiry into the Policy necessary to advance the well-being of the Province. By WILLIAM KINGSFORD, Civil Engineer. Toronto: Rollo & Adam. 1865. 12mo. pp. 191.

Following the arrangement adopted in Mr. Kingsford's book, we may discuss our existing canal systems under the following heads:

---

* "The interior of North America is drained by the St. Lawrence, which furnishes for the country bordering on the Lakes a natural highway to the sea. Through its deep channel must pass the agricultural productions of this region. The commercial spirit of the age forbids that international jealousy should interfere with great natural thoroughfares, and the Governments of Great Britain and the United States will appreciate this spirit, and cheerfully yield to its influence. The great avenue to the Atlantic, through the St. Lawrence, being once opened to its largest capacity, the laws of trade, which it has never been the policy of the Federal Government to obstruct, will carry the commerce of the North-west through it."—Report of Commissioners appointed by the State of Illinois, in 1863, to communicate with the Canadian Government on the subject of our canals. In referring to this Report, Mr. Kingsford observes (p. 168): "It is estimated that from the State of Illinois alone, there has been shipped annually, for the last ten years, a surplus of food sufficient to feed ten millions of people, and, at the same time, there has been a positive waste from the inability to bring the crops profitably to market."

(1) the Chambly Canal; (2) the Rideau Canal system; (3) the St. Lawrence Canals; and (4) the Welland Canal. The Chambly Canal was constructed to avoid the long stretch of rapids between St. John's and Chambly, which presents between these points a total difference of level of 74 feet; but viewed in its complete relations, or in connection with the River Richelieu, Lake Champlain, and the Whitehall or Champlain Canal of New York, it may be said to unite the waters of the St. Lawrence with those of the Hudson. Although first devised by a private company in 1819, the work was finally constructed by government, its commencement dating from the latter end of 1831, and its actual completion—a delay having arisen from the exhaustion of the sums allotted for its construction—from November, 1843. The total cost, up to its day of opening, was $480,816. Its length is 11½ miles; and it contains nine locks of 124 feet by 24, with a depth of 6 feet on the sills. The Saint Ours lock and dam, on the Richelieu, 12 miles above Sorel, properly forms part of the Chambly Canal system. This work was finished in 1849, at a cost of $114,554. Its object was to remedy the comparative shallowness of the river, and to increase the supply of water to the canal. In 1863, the canal and lock together seem to have yielded a net revenue of $9,500, or somewhat less than 2 per cent. upon the actual cost. To improve the limited capacity of this canal, or to open a more ready communication between the upper St. Lawrence and New York via the Hudson River, several projects have been devised. These comprise: (1) An enlargement of the existing canal with an increased elevation of the dam at Saint Ours to the height of 4 feet, so as to ensure 10 feet of water in the Richelieu at all seasons: estimated cost, $2,016,080.—(2) The construction of a canal from Longueuil, immediately opposite Montreal, to St. John's: estimated cost, $3,473,360.—(3) The construction of a canal from Caughnawaga, nearly opposite the teminus of the railway at Lachine, to St. John's, with the Champlain level as a summit; length, 34½ miles, with three locks: estimated cost, $3,706,230.—(4) The construction of a canal from Caughnawaga to St. John's, supplied by a navigable feeder from the St. Lawrence; length 25½ miles, with eight locks: estimated cost, $4,267,890.—(5) The construction of a branch in connexion with the existing Beauharnois Canal, running from Beauharnois to St. John's, 37·66 miles, and descending to the Champlain Canal by three locks: estimated

cost, $3,369,400. These estimates assume a width of canal, at bottom, of 80 feet. The locks are assumed to measure 230 feet by 36 feet, with a depth of 10 feet of water on the sills. Although these projects refer entirely to the eastern section of the Province, they are not, in the estimation of their promoters, without important collateral bearings upon western trade. Mr. Kingsford discusses this question very thoroughly; and as his views upon the subject, although differing from those generally advocated, appear to be based upon much patient inquiry, and to be free from anything like special pleading, we lay them before our readers, in his own words:—

"The objects proposed by the Canal are two fold:

I. "To compete with the Erie Canal, both by the route at its entrance at Buffalo, and *viâ* Oswego; and to create facilities for vessels from the upper lakes to pass down the Saint Lawrence, through the proposed Caughnawaga Canal to Lake Champlain, and thence to New York. Likewise to ensure an easy and cheap communication for vessels freighted with wheat and other grain for the Eastern States, to connect with the Boston Railway at Burlington.

II. "To provide an improved communication for the Ottawa lumber trade, and its consequent business with New York and the Eastern States.

I. "It may be remarked that the destination of a vessel will be determined before it leaves Lake Erie; and that consequently few occasions will arise, when a vessel passing through the Saint Lawrence Canals, within a few hours of Montreal, would seek the New York Markets.

"The distance from the east of Lake Erie by the Erie Canal to Albany, entering at Buffalo, is 352 miles.

"*Viâ* Oswego by Welland Canal it is:

"By Welland Canal	28 miles.
" Lake Ontario to Oswego	138 "
" Oswego Canal to Syracuse	38 "
" Erie Canal from Syracuse to Albany	166 "
Total	370 miles.

"Being 232 miles Canal navigation.

" 138 " Lake "

"By the Saint Lawrence it is as follows:—

"By Welland Canal		28 miles.
" Lake Ontario to Kingston		160 "
" Kingston to Caughnawaga:		
"River Navigation	132 miles.	
"Canal	35 "	
		167 "
Carried forward		355 miles.

Brought forward	355 miles.
" By Caughnawaga Canal	25½ "
" River Richelieu to Rouse's Point	23 "
" Lake Champlain to Whitehall	111 "
" New York Champlain Canal to Albany	73 "
Total	587½ miles.

"Being 161½ miles Canal navigation.
" 426 " Lake and river navigation.

"We observe by this comparison that by far the shortest route for a vessel from Albany to the Upper Lakes is by the Erie Canal: accordingly, there must be manifest advantages in other respects to counterbalance the fact, that to reach the foot of Lake Erie by Lake Champlain and the Saint Lawrence, 217 miles additional distance must be travelled. On the other hand we must remember that there would be 70½ miles less canal navigation than by way of Oswego. Therefore with the greater distance, the Champlain and St. Lawrence route, if admitting the passage of vessels of greater tonnage, would be preferable. For quicker trips could be made, and from the increased capacity of the vessel, the greater cargo, with the relative less expense, would bring more profit to the forwarder. Moreover a vessel of this character could discharge at New York, and avoid the delay and cost of transhipment at Albany entailed upon vessels passing through the Erie Canal. The limited accommodation of the New York Champlain Canal* is a bar to the establishment of the trade. Were the enlargement of this Canal an admitted necessity, and it were at once to be undertaken, the route

---

*"The length of the Champlain Canal from Whitehall to its junction with the Erie Canal at West Troy is 66¾ miles; continuing by the latter to Albany the distance is increased by 73 miles. It is supplied by a feeder from the upper waters of the Hudson at Glen's Fall, 282 feet above the tide water at Albany—7 miles long having 13 locks. The summit level of the Canal is 150 feet above tide water.

"The up lockage from junction with Erie Canal at West Troy to summit level at Fort Edward is	125¼ ft.
"The Erie Canal level below that point is	24¾ "
	150
"The down lockage from east end of summit level at Fort Ann to Whitehall is	54¼
"Accordingly the elevation of Whitehall above tide water at Albany is	95¾ ft.

"The locks are 20 in number, and 90 ft. by 15 ft. in size, with 4 ft. water on the sills. The only vessels which navigate this Canal are the old fashioned Canal boats towed by horses.

"The height of Lake Champlain is here given according to the authority of American Engineers. But it is proper to mention that it is not authenticated by Canadian experience, which places it no higher than 84 feet. That this discrepancy arises from error, is proved, independently of its magnitude, by the fact, that while the Americans taking tide water at Albany as a datum make Lake Erie 565 feet above it, the Canadians taking tide water at Three Rivers as a basis make Lake Erie 564½ feet higher, which would go to shew the not unimportant fact in physical geography that the Saint Lawrence at Three Rivers and the Hudson at Albany are at about the same level. I am not aware that this fact has been previously published, and I owe it to Mr. Walter Shanly, that I can state it here. It may be added that this matter has been somewhat closely investigated by us, and the opinion is strongly entertained that the error does not lie on our side.

would then assume a character which it has not at present, and the Caughnawaga Canal would be a definite link of it. The necessity of the construction of this work could then be urged. But it can scarcely be hoped that the New York Legislature would desire to encourage an improvement which would create a formidable opposition to the only great state work which it has to protect by legislation. The Saint Lawrence has already proved a formidable rival to the New York Canal system, and it seems there is no interest, particular or local, which would be powerful enough to carry any measure at all injurious to the Erie Canal. Besides, in estimating the chances of realizing any project, we must consider the outlay it involves; and certainly to increase the sixty-seven miles of the New York Canal to the size of the proposed improvement of the Saint Lawrence Canals would exact an expenditure of from twelve to fifteen millions of dollars.

"It is convenient to state in this place the opposite view. The advocates of the construction of the Caughnawaga Canal totally independent of the improvement of the Whitehall navigation, argue in its favour with much ability. They contend that it would at once take the Western grain trade both for the Eastern States and for New York.

"The New England States form the great mart for Western produce, which now finds its way through the Erie Canal by Buffalo and Oswego, to New York; whence it generally passes by water to Boston and other ports on the north-east coast. What is not taken by water is distributed by railway. It is argued that the imperfections of this route are such, that were facilities given to reach Lake Champlain, that route would be followed to Burlington—a distance by railway from Boston 248 miles—at which point a transhipment would be made to the rail of the cargo or cereals; the propeller at once obtaining return freight of New England manufacturers for the west. A comparison of time is made in order to shew that the 20,000 bushels of wheat or 6,000 barrels of flower would be at Boston long before it had even passed through the Erie Canal; and under one phase the favorable estimate is not to be disputed. But the element of time in this instance is of secondary consideration. Yet are we so sure if a heavy railway traffic of flour and grain passed over the railway there would be no delay? If the transfer were direct from the propeller to the wheat car there would be a certain guarantee of immediate transmission; it would however scarcely be possible to count upon that connection, and it is a legitimate inference that the natural period of the route would be much prolonged by circumstances. On the other hand the present mode of traffic warrants the opinion, that the forwarder of Western produce will cling to the water as long as he is able, unless compelled to abandon it under extremely unfavorable circumstances. But should he desire to transfer to the railway car his freight of breadstuffs for New England; would it not be profitable for him to do so at Ogdensburg—distant from Burlington by railway 158 miles? This line was built with Boston capital to gain that traffic, but it has not done so. It is true that the distance by the Caughnawaga Canal to the same point would be very little in excess of the railway, 220 miles, of which 69 will be by canal. I at once admit that of the two routes to Burlington the latter would be the best and cheapest; and taking in view the necessity of transhipment, the quickest. But I do not think that the comparison can be allowed to remain in this limit. From Burlington to Boston, *via* Vermont Central Railway, is 248 miles, and it seems to me this extent of railway distance is the bar to the route as a whole; and that were the route to Boston *via* the Saint Lawrence and Burlington one advantageous to adopt, the transhipment from the propeller to the rail being a cost and necessity under any circumstances, it would be as profitable to take the rail at Ogdensburg as at Burlington. The presumption is at once rejected, on the ground that a comparison between Ogdensburg and Albany has a totally different relationship, to the comparison of transhipment at Albany with transhipment at Burlington. But is not the fact clearly stated, when we take into account the railway distance between the three points and Boston.

	MILES.
1. "From Ogdensburg to Boston	406
2. "From Burlington "	248
3. "From Albany "	200

"Side by side of which must be considered the peculiar water navigation of each route. Both at Ogdensburgh and at Burlington a break of bulk will be avoided, one transfer of the cargo from the propeller to the railway being incident to each. Both at Buffalo and at Oswego the cargo is divided among smaller craft again to be re-handled in order to be put on the railway. It is contended that the less distance of railway carriage (158 miles) gives Burlington an immense advantage over Ogdensburgh, and the one transhipment an equal preëminence over Buffalo and Oswego.

"I am aware that there is a great difference of opinion with regard to this matter: accordingly I have endeavored to present both sides of the argument. Many public men to whose opinions I attach great weight have implicit faith in the project, and consider it the first necessity of the many improvements. Such as these also affirm that even with the present dimensions of the Whitehall Canal, the New York trade would pass by the Lake Champlain route. The reasoning is parallel with that urged in regard to the New England States. That is to say, the greater bulk of cargo will admit of the longer distance. We must bear in mind that from Oswego there is 170 miles of Canal to Albany, and that before the 67 miles of the Whitehall Canal be reached 300 additional miles of navigation have to be passed over, of which 60 miles would be canal navigation, and that equally the bulk of the propeller's cargo must be broken at the end of both routes.

"I must say that to my mind the advantage lies on the side of Oswego to such an extent that every little trade would seek Lake Champlain.

If this reasoning be correct it follows :

1. "That until the Whitehall Canal is enlarged, the preferable channel from the upper Lakes to Albany is, in ordinary circumstances, by Oswego.

2. "That there is no ground to hope that the Whitehall Canal will be improved, and that in such a case competition with the Erie Canal is an impossibility.*

---

* "I advance this opinion on the ground of the great cost of the work, and the influence which western New York would bring against the project. I do not say that the vote of the State Legislature to carry this improvement would be the death warrant to the prosperity of Buffalo and Oswego, but it would most certainly injure them materially by changing the direction of the lake grain trade. On the other hand the cities on the line of the Erie canal, Rochester, Rome, &c., would perhaps be favourable to the scheme, as it would remove the pressure from the navi-

3. "That the balance of probability is not in favor of the supposition, that the grain freights to the Eastern States will take the Caughnawaga Canal to Burlington. Therefore, that the canal would be at the best, an experiment made at the cost of four millions, and concerning which opinion is much divided.

4. "It would therefore seem that the project posseses no positive and assured result beyond extending facilities to the Ottawa trade for New York and Boston. That it is desirable to have as direct a route as possible is a commercial axiom. But would the Country in its present condition be justified in expending $4,000,000 to save at the most a couple of days to the vessels engaged in the trade. For the limit of the Whitehall Canal would still control the tonnage of vessels passing through it. All the lines pointed out have solid advantages, and much can be said in favor of nearly every location. Perhaps the route with a navigable feeder from the Beauharnois Canal with its special terminus at Caughnawaga may claim the preference. For evidently to lock down the difference of level between the River at Caughnawaga, and at Montreal again to lock up to the level of the Champlain Canal, can hardly be commended.

"The difference in distance from Lake St. Louis to Saint John's would be 16.25 miles in its favor, viz:

"To cross River	2	miles.
"Distance by the Lachine Canal	8.5	"
"Across river at Montreal	3	"
"By Canal from Longueuil	28.25	"
"Total	41.75	miles.

"Caughnawaga Canal, being to the same point 25.5 miles.

"This subject has been entered into at some length in detail, as it will doubtless again become a topic of public discussion."

The Rideau Canal system unites the Ottawa with the city of Kingston on Lake Ontario, and thus practically connects the latter with Montreal, without the intervention of the St. Lawrence. It consists of the Rideau Canal proper; the Grenville and Carillon Canals; the Saint Anne's lock and dam; and the Lachine Canal. The latter, however, may be considered more conveniently as forming part of the St. Lawrence system. The Rideau Canal connects the Rideau and Cattaraqui Rivers, availing itself, within is course, of several intervening lakes of small size. It contains 47 locks, of 134

---

gation and accordingly admit of a more rapid passage through it. It now takes 15 days to get a boat through from Buffalo to Albany. My own opinion is, that with locks 250 feet long, 45 feet wide, with 13 feet of water, vessels would sail through the Caughnawaga and Whiethall Canals direct from Chicago to Boston, and that the western grain shipper would entirely abandon the Erie Canal. A contigency of this character, and with these results, would awaken an opposition, which at the moment seems insurmountable, more especially as the interests of the city of New York lie in the direction of maintaining the present condition of trade.

by 32 feet*. Devised, at the outset, entirely for military or defensive purposes, its construction was carried out by the Imperial Government, and it was only transferred to the Provincial Executive in 1856. It appears to have been commenced in 1826. In its formation, dams have been largely used to overcome the effects of rapids. This mode of structure may be economical in the first instance, but, in addition to its liability to drown many acres of land, it is open to the great risk of being damaged and often entirely destroyed by ice and freshets; and it necessarily entails, after a few years, a considerable annual outlay for repairs and maintenance, even if it escape any serious disaster. The total cost of the Rideau Canal is usually quoted at about £1,000,000 sterling, but that estimate is probably above the true sum. Its expenses in 1863 appear to have exceeded its revenue by about $8,000, and to have been still more disproportionate during the five or six preceding years.

The Carillon and Grenville Canals are three in number, but their combined length is under six miles. They are constructed to avoid the Longue Sault rapids on the Ottawa, and the Chûte-à-Blondeau, and other rapids near Carillon, on the same river. Altogether, the locks are eleven in number, three on the Grenville Canal being less than 20 feet broad. Vessels drawing more than 4½ feet of water are unable to pass through these canals. The Saint Anne's Lock and Dam, situated near the celebrated rapids lower down the stream—the burden of Moore's familiar boat-song—was completed in 1843. The lock is 190 feet long by 45 feet broad, with a lift of 3½ feet. The Carillon and Grenville Canals appear to have been always worked at a loss, ranging from $700 in 1863, to $7,425 in 1862, $7,295 in 1861, and $9,491 in 1860. In 1863, the returns of the Saint Anne's lock exhibit a net revenue of $3,816; but during the three preceding years, there was an annual loss of between $2,000 and $3,000. On the other hand, between 1843 and 1859, the lock appears to have yielded an annual profit, averaging from $2,000 to $5,000. These figures are, of course, exclusive of the interest on the construction cost.

The St. Lawrence Canals, constructed for the purpose of connecting Lake Ontario directly with the seaboard, are properly four in number, as shewn by the annexed table, extracted from Mr. Kingsford's book :—

---

* The limits and general character of a review compel us to omit many technical and engineering details in reference to this and other canals brought under the reader's notice It is but right to state, however, that these details are given with great exactness and. amplitude in Mr. Kingsford's book.

—		Number of Locks.	Mean Rise, in feet.	Length, in miles.
1. The Lachine Canal		5	44¾	8½
2. The Beauharnois Canal		9	82½	11¼
3. The Cornwall Canal		6	48	11½
¼. Williamsburg Canal.	Farren's Point	1	4	¾
	Rapide Plat	2	11½	3¾
	Iroquois Junction Gallops	3	15¾	7⅝

The annual revenue of these canals, from their opening in 1861, appears to have generally exceeded the cost of their maintenance and management. The net revenue in 1863 is stated at $49,232—thus yielding, according to Mr. Kingsford's estimate, a dividend of about three-fourths of a per cent. on their construction cost.

All Upper Canadians must be familiar with the position of the Welland Canal. Constructed to form a navigable channel between Lake Ontario and Lake Erie, rendered necessary by the great Falls and other obstructions of the Niagara River, this important work is 28 miles in length, with a summit level of 330 feet, and 27 locks. Three of these latter, or those between Port Dalhousie and Saint Catharines, present dimensions of 200 feet by 45 feet. The others, with the exception of the lock at Port Colborne which is 240 feet by 45 feet, measure 150 feet by 26·6 feet. The depth of water on the sills, originally 9 feet, was raised an additional foot in 1853. The history of public works too frequently reveals instances of extreme mismanagement, of want of foresight, and reckless expenditure; but few, we think, can compare in these respects with that of the Welland Canal. The chapter in Mr. Kingsford's book, which records the history of this canal, is so replete with suggestion, and so interesting, moreover, in itself, that we are induced, at the risk of a somewhat long quotation, to extract from it the following account of the origin and general progress of the work in question :—

> "The history of this important work* is so marvellous and so little known, to some extent even so misrepresented, that a consecutive narrative is indispensable, correctly to understand the vicissitudes through which it has passed. So far as the writer knows, no connected account of it exists, and it has to be traced out

from official documents, and the records of legislative proceedings. One fact is certain: had not the project been of a character which nothing could destroy, it would long since have irretrievably foundered. This Canal can be adduced as one of the many proofs, how almost impossible it is to destroy that which has inherent vitality. The honor of being its originator has been claimed by many; but it was precisely one of those projects which the situation itself suggests. The earliest settled parts of Western Canada were those easiest of access to the new United States, from which the United Empire Loyalists came. Thus both Kingston and Niagara, two old French posts, had been resting points for years. Their names figure largely in the French wars; and as known and identified localities, they attracted many who clung to the British flag even in its reverses. Accordingly much of the early immigration came in by Newark—the present town of Niagara—and the surrounding district was settled early in the history of Western Canada. No one who had heard of the Duke of Bridgewater's Canal,

---

"* The history of the Welland Canal, until the close of 1835, is contained in a report of the Select Committee of the Upper Canada House of Assembly, appointed to enquire into its management. It is a volume of 575 pages, and contains some very extraordinary revelations. It does not fall within the scope prescribed to the writer to allude except in general terms to this document. Its contents cannot be entirely ignored even here, and it will be a special duty of the historian of the last fifty years to reproduce this Chapter in Canadian history. It may be briefly stated that of a Committee of nine, seven signed the report, in which it is stated that the books and accounts of the Company had been 'kept in a very careless, irregular and improper manner, highly discreditable to a public body.' That even on a partial investigation there was a defalcation of upwards of £1724; that the clerks were only able afterwards to account for £266 of this sum; that an item of £579 paid to a director was falsely entered in the accounts; that unjustifiable expenditure was entered into; 'that the sum of £447 10s.,' for loss on Steamboat Peacock, 'is enveloped in mystery;' that there were irregularities anything but creditable to the Company's officers; that the various sums of £2500, £1000, £178 13s. 5d., £164 14s., and £100, 'were without any authority of the Board given on loan to officers and directors;' that a Secretary was appointed quite incompetent for the discharge of his duties; that improvident contracts were entered into, some of them most shamefully performed to the serious injury of the Company; that modes of raising money without the approbation of the Directors 'was to say the least of it, highly injudicious, and might have involved the Company in serious difficulties; that the officers of the Company received water privileges, a proceeding stigmatized as highly improper; that in 1831 the Company sold to 'an alien,' through a third party all the lands of the Company, amounting to nearly 15,600 acres for £26,000; that 18 months interest was paid and refunded in the shape of water damages; that in 1834 the Company resumed the land excepting 200 acres in Port Colborne and Allanburgh, cancelling the debt of £25,000, and giving bonds with interest for £17,000 more. 'This transaction, to your Committee,' was 'inexplicable: no statement that they have heard has satisfied them of the justice or even expediency of an arrangement which, if applied to the ordinary transactions of life, would not only be deemed ruinous, but the result of insanity.' Further, that large sums of money were missing; that a shorter route for the Canal might have been selected at less expense to the proprietors, that the monies were expended improvidently; that a debt of £30,000 was forgiven without an equivalent; that £1340 worth of timber was bought, and which was 'allowed to be stolen and lost to the Company without one shillings worth ever being accounted for;" that some was sold without the Company receiving benefit from the sale, and that some was used by contractors without the material being charged to them.

"When it is added that everybody was exonerated from blame, and that not the least stigma was ever attached to any of the public men who were included in the above proceedings, further comment is useless.

and of Brindley; of Smeaton's Forth and Clyde, or Telford's Caledonian, could have failed to see the necessity of connecting the two lakes by artificial navigation. The Erie Canal was during this period, either proposed or in course of construction, and its example must have stimulated the appreciation of the geographical advantages apparent in the Niagara peninsula. The war of 1812, however, gave the great spur to thought. It has been seen also in the case of the Lachine Canal, that Sir George Prevost pointed out its necessity; and the news of that recommendation would be suggestive in the western world, of what was needed there. In the account of the Cornwall Canal, mention has been made of Gourlay and his views of the improvement of the Saint Lawrence. The description of them shows how imperfectly he understood the subject, and how visionary were his ideas. Such however as he was, so far as the enquirer can judge by existing records, he may be mentioned as the first who gave any defined views in writing on the subject; this was in 1819. And in his "Statistical Account of Canada," published in London in 1822, he furnished a map of the District, and pointed out the necessity of a Canal. He had, however, very crude ideas of what the work should be, and although his opinions are enunciated with much positiveness, his knowledge of the subject was evidently superficial to a degree. The friends of the late Mr. Merritt assert that he communicated the idea to Gourlay. It is a fair inference, that Gourlay can claim no particular originality of design; and if the thought in the first instance came from Mr. Merritt, is was a mere echo of a generally expressed opinion. But whoever the originators were, very little merit is due to them; for a wilder, more ill considered scheme than the one originally put forth, one shewing more ignorance and recklessness on the part of the projectors, it is scarcely possible to conceive.

The public accounts show the cost of the work to be about six and a half millions of dollars. The original estimate was £26,000, or $104,000.

The first idea of the route was to run up the natural waters of the Welland River or Chippewa Creek, and to pass across the township of Thorold, tunnelling through the high ridge of land about a mile and a half wide, and then proceeding direct by Canal to the brow of the high land. The latter was to be descended and overcome by a Railway connecting, by means of another Canal, with the navigable waters of Twelve Mile Creek, by which egress to Lake Ontario should be effected. The navigation was simply to be for *batteaux* and barges.

This project was put prominently before the world in 1823; an engineer of the name of Mr. Hiram Tibbett furnishing the description of the route. Public meetings were called, circulars were sent, and an address to the people of Upper and Lower Canada authoritatively disseminated, in which the probable expense of the undertaking was named at £22,125. Early in 1824, a petition was sent to the Legislature asking for an Act of Incorporation for a Canal, to admit boats of from 20 to 40 tons, and at the same time defining the route. The capital was named at $150,000, being 3,000 shares of $50 each. The work was commenced on 30th November, 1824, 'and as a proof how little the subject had attracted public enterprise at the time,' says an official document, 'not half a dozen gentlemen of capital or influence in the district attended this ceremony.' The actual amount of stock subscribed at this time cannot be authoritatively given, but as the sum total of the subscriptions in Upper Canada amounted in 1836 only to £3,712 10s. the money in the Treasury must have been a small sum. It is true subscriptions had been taken up in Lower Canada and in the United States, but the Quebec subscribers, even in the previous year, had shown a marked want of confidence in the scheme. In the Annual Report, the Directors gave no figures; they merely stated that 'a sufficient quantity of stock had been subscribed.' Early in 1825 the Company came before the Provincial Parliament and obtained an amendment to their charter to raise the stock to $800,000; and the Canal was extended for sloop navigation. We learn from a statement of Mr. Merritt that on the passing of this Act the Hon. J. H. Dunn, 'the President proceeded to New York and obtained £75,000 subscriptions.' The Committee reported in 1836, that the maximum of United States subscriptions was £69,625; a proof that the work had been commenced the preceding year with literally an empty exchequer. The ground was re-surveyed. The Welland River route was considered objectionable; or at the best to be developed to hasten the connection of the two waters; for although it was still to be retained, the advantages of a direct opening to Lake Erie through the Grand River was specially commended. The distance was estimated at 41 miles. Nevertheless it was still urged that a connection with the Welland River was virtually a connection with Lake Erie; that its junction with the Niagara River was only 18 miles from the lake; and that although the current was strong, vessels could sail up against it. But at the same time it was represented that there would be difficulty in passing Fort Erie, owing to the great rapidity of the stream below that spot. It was accordingly considered advisable, that in order to avoid 'this impediment to navigation,' and to attain 'other important advantages,' a connection should be effected with the Grand River, which turned at a high level into a navigable feeder, would furnish both a sufficient supply of water and extend a satisfactory and quiet navigation. Considering that the work had been commenced, the discovery came late. But a change from the entrance by the Welland River, was in any circumstance wise and expedient. The size of the locks was established. The dimensions were 100 feet × 22 feet, wlth 7.6 feet depth of water: they were maintained in the construction of the first Canal, except that the sills had only 7 feet. The locks were 40 in number.

The route thus determined, the contracts were partially given out in November, 1826, at least it was so stated before the Committee of the House of Assembly, and the work from the Welland to Lake Ontario was to be so far completed by April, 1827, that the communication to Lake Erie would be assured by that date. The connection by the Grand River was hereafter to be developed. In this position, an application was made to the Legislature for assistance. Sir Peregrine Maitland was then the Lieutenant-Governor, and he appears rightly to have estimated the importance of the project. The ground of this assistance is succinctly stated, viz.: that £25,000 had been subscribed in the Canadas;—the actual amount was not £14,000—that £75,000 had been subscribed in New York; and that the directors 'being desirous that at least a majority of the stockholders should be British subjects,' a limit had been placed on American stock to that extent, and that accordingly £100,000 had been left for the English market; that the 'Canal was rapidly advancing,' and to prevent any delay in meeting the obligations consequent upon these works a loan of $100,000 was asked; a loan, the first of a very long series. The money was granted 9th January, 1826: 21 voting for the bill and 12 against it. Nor was this the only aid the Company received, for in a communication dated 30th September, of the same year, Lord Bathurst informed the Lieutenant-Governor, that the British Government would contribute the same assistance which had been given to the Lachine Canal, viz.: one-ninth of the estimated cost towards the completion of the Welland. As the cost was named at £147,240, the quota offered by the British Government was £16,350; the equivalent being free toll on Government stores for ever. With this material aid, the work went on in comparative tranquility, diversified by the failure of contractors, and the consequent arbitrations. But it was found that the stock did not sell in the London market; so an appeal was made again to the Legislature in January, 1827. This time a loan was not asked, but the Legislature was prayed to take £50,000 worth of stock. The Special Committee recommended that the stock should be taken, as the completion of the entire Canal would be placed without a doubt; and that the countenance of the Government would give a value to the shares, so that they would be generally sought after. Further, it was suggested that the stock was, in all respects, as good security as any which could be obtained for a loan; and it was obscurely hinted that the Imperial Government 'from public inducements might take possession of the whole work,' 'an arrangement which would be facilitated by the Government becoming stockholders.' The Act affording aid was passed the 5th February, 1827. The Bill however had a very narrow escape, 20 voting for and 18 against it. It is thus very evident that the scheme had fallen into great disfavor, so much so that Sir Peregrine Maitland in his speech in proroguing Parliament made special allusion to it. He said he felt the responsibility of giving this additional aid, and that he cheerfully shared that responsibility. The result of this encouragement was, that the Legislature of Lower Canada likewise subscribed the sum of £25,000, taking stock to that amount.

"The year 1828 found the Company still embarrassed. The enquiry of after years drew out the fact, that there was still £38,837 1s. of stock not taken; and it shews how recklessly this work was begun, and the extent to which foresight and calculation were wanting. It was now considered that the sum of £90,000 was required to finish it. The amount in the exchequer was a little more than £21,000, and this was only prospective, being 19 per cent. on 8,893 shares. As it seemed that little could be obtained from the Canadian Legislature, an appeal was made to the Imperial Government who, with a truly Imperial generosity, advanced to the undertaking £50,000 sterling; security being given on the tolls, funds and all property of the Company. In the year 1829, no loan was applied for. The works were, nevertheless, pushed on with great energy so that two vessels, in the month of November, passed between Lakes Ontario and Erie. In the following year this fact was made a ground for a new appeal to the Legislature. It was certainly something to say that vessels drawing 7½ feet of water with 21½ feet breadth of beam, could sail from Lake Ontario, a distance of 16½ miles of canal, ascending 34 locks, and pass down the River Welland to the Niagara. It may be worth while to preserve the names of the schooners: they were the 'Ann and Jane,' and 'R. H. Boughton.' The route of that day may be thus briefly described. About a quarter of a mile west of the entrance to the Welland River, a canal commenced, leading to that stream, through which the route ran, 9½ miles, ascending by two locks to the deep cut, at which point the Canal proper commenced, the feeder of which was the Grand River, carried by an aqueduct across the Welland; from this point it descended to Lake Ontario. The sum of $100,000 was named in this year as necessary to complete the work, and the petition prayed that the stock should be increased to $300,000. Reference to the records of Parliament of that day, shows how unwelcome the application was. It was, nevertheless, favorably entertained, 19 voting for, and 9 against it. It was during the debates on this grant—which were evidently stormy enough throughout—that, on a motion that the Welland Canal Loan Bill be read a second time that day three months, the votes were equal—24 against 24 ; the Speaker, the present Mr. Justice McLean, giving a casting vote in the negative. Throughout the session the measure was violently opposed, and escaped only by majorities of two and three. Besides granting the money, the Act likewise authorized the appointment of a Commissioner to examine the canal, and to report to the Lieutenant-Governor all facts and information that might be useful to aid in forming an opinion of the progress of the work. Mr. Randall, who was appointed to this duty, reported 31st May, 1830. He bore general testimony in favour of the stability of the works. Specially he examined the "Deep Cut," which gave much trouble during construction. His remarks throw little light on the subject, but he regrets that more preliminary precaution had not been taken. At the close of the year, the work was so far completed as to afford a convenient communication by the Welland River. But the Directors were not satisfied ; the route was described as "tardy and circuitous ;" and it was determined to apply to the Legislatures of both Provinces. and to ask equally of each $100,000, so that a Canal would be taken directly to Lake Erie. On the 14th of March, 1821, an Act to afford further aid to the Welland Canal was passed, authorizing the Receiver-General to issue $200,000 of debentures, as a further loan. It was much opposed; 25 voting for and 21 against it. In 1832, no call was made upon the Legislature ; but, in 1833, an Act of affording further aid towards the completion of the Welland Canal was passed, appropriating $30,000 to subscribe for the unsold stock, and at the same time the expenditure of the sum was placed in the hands of Commissioners. In 1834, fresh legislation was called for. It was stated that the means of the Company were exhausted; that the concern was in debt $100,000, and another $100,000 was needed "to put the canal in a complete state for use the next season." Such was the unpopularity of the scheme, that the Committee of the House to whom the petition was referred, shrank from the responsibility of making any recommendation. They hoped that something might be done to place the Canal in such a situation as might be most beneficial to the public interest. The members who supported the petition acted with their usual energy, and it resulted that an additional aid of $200,000 was given, stock being taken to that amount. The money was raised by debentures, paying 6 per cent. The votes on the motion were 22 against 14. The stock was likewise, by enactment, increased to a million of dollars. It was further provided that the affairs of the Company should be managed by four directors, three of whom should be named by the House of Assembly. It is true, that by these means an apparent control was placed in the hands of the Legislature; but, by accepting the responsibility, the House became, as it were. identified with the future management. The year 1835 was marked by no particular vicissitude. Sir John Colborne was then Lieutenant-Governor, and he communicated to the House an Imperial despatch from Mr. Spring Rice, the Colonial Minister, that he could not recommend the Imperial Government to cancel the debt of the Canal Company of £50,000, for a loan only made five years before. The Assembly had, with some inconsistency, asked this act of favor at the hands of the Imperial Government; on what ground it is somewhat difficult to say. During the session, Messrs. Thorburn, Duncombe, and Mackenzie were appointed directors. There cannot be a doubt that these gentlemen went to their duties with a knowledge of the general dissatisfaction which existed generally in the Province. The continued calls on the public chest, the unsatisfactory and contradictory statements, the Canal ever on the verge of completion and never finished, had destroyed all confidence in the management of the undertaking. There seems to have been a foregone conclusion that the Canal was a necessity, and that if the Province did not complete it, it would remain unfinished; and it followed that the Province must take possession of it. Feelings of this character led to a very unfriendly supervision of the accounts and antecedents of the Company, and ended in Mr. Mackenzie making thirty specific charges against the directors. The decision of a Committee of the Legislature, appointed to consider them has already been given.

"The following "concise statement of the property in the Canal, as it is held by individuals and the public," was appended to the report:

Loan by Great Britain (Prov. cur.)	£55,555	11	2
Loan by Upper Canada	100,000	0	0
Stock taken by Provincial Legislature	107,500	0	0
Stock taken by Lower Canada	25,000	0	0
Stock in England by private individuals	30,127	10	0
Stock in United States by do	69,625	0	0
Stock in Lower Canada by do	13,825	0	0
Stock in Upper Canada by do	3,712	10	0
Stock in New Brunswick by do	500	0	0
	£405,855	11	2
Advanced this year by Parliament	2,000	0	0
Total	£407,855	11	1

The report concluded by stating that £425,213 3s. 5d. had been expended, "less £100, which appears to be balance in hand 30th December, 1835." No money was, however, obtained that session. But in November, 1836, the Directors came again before the House: Sir F. B. Head was then Lieutenant Governor. On the petition of the Company, a select Committee recommended that the Canal should be made strictly a public work; and that the Receiver General should issue debentures to the stockholders for their stock. An amendment was moved to the report, limiting the expenditure to the money sufficient to keep the Canal in repair, but, although proposed by the Solicitor General, it was voted down by 31 against 27. On the 17th December, a second report was presented. It sets forth that the sum of of £814, 319 6s. 2¾d. (*sic*) was the amount required to be paid by the Province to make the Canal "strictly a public work:" including the Provincial expenditure for stock taken, and for the several loans advanced to the Company. Of this sum £200,000 was estimated as necessary to complete the Canal permanently. The report did not recommend that the whole money should at once be paid: £100,000 would be ample for 1837, which would include £55,000 to replace the wooden locks by stone structures. The matter, in this position, came before the House on the 11th January, 1837. The first resolution was carried by a vote of 29 against 6. It affirmed the paramount importance of the Canal, the necessity of its completion in a substantial manner, and that stone locks should be substituted. The remaining resolutions appropriating the following sums were voted through with little opposition:—

£20,000	to purchase the Hydraulic Works sold.
£25,000	to enable the Company to pay its liabilities.
£200,000	to complete the Canal in a substantial manner.
£117,800	to purchase the stock of private individuals.

The Act embodying these resolutions was carried by large majorities. Indeed it was now apparent to all, that without the direct intervention of the Province, the Canal would experience fresh difficulty. Still the Legislature did not advance the full step of assuming the work. The £102,000, previously advanced on loan, was turned into stock, and the Government was authorized fo subscribe £245,000 new Stock ($980,000.) The Capital Stock of the Company was declared to be £597,300. The Directors were further limited to an expenditure of $400,000 on the Canal, in full of repairs, new works, and old debts, during the year. The troubles of 1837 and 1838 prevented any further legislation, and no further steps were taken with regard to the shareholders until April, 1839, when a resolution was carried by a vote of 26 against 9, that the private stock should be purchased by the Province, in order that the Canal should become wholly the property and be under the management of the public. As above stated, the amount was £117,800, of which, in 1836, £31,712 10s. was owed in Canada. Of all legislation on this subject, this record is the most pleasing to read, for it was just and honest; and as the stock was not held in the Province, it was untinctured by selfishness, while at the same time it was necessary and politic. The Bill was reserved for Her Majesty's pleasure. When the legislature met, later in the year, even the pressing business attending the Union Bill did not deter "the friends of the measure" from moving an address, asking her Majesty to give her assent. It was carried on the 25th of January, 1840 by 23 against 11. The bill, however did not become law until the 5th July, 1841, the first session of the United Parliament, when Lord Sydenham sent a message to the House announcing that Her Majesty had confirmed the Bill in Council on the 11th of September previous.

We have now arrived at that period in the history of the Province when the improvements were carried on systematically and simultaneously. In opening the first United Parliament, 15th of June, 1841, Lord Sydenham dwelt on the improvements in the navigation, promising the Imperial guarantee to the loan required "to effect them. "The generous aid," continued his lordship, "which I have already announced to you; the determination which I am also empowered to "state on the part of the Government, to devote annually a large sum for the military defences of the Province; the fixed and settled determination which I have "the Queen's command to declare, that her North American possessions shall be "maintained at all hazards, as part of her empire, are pledges of the sincerity with "which the mother country desires to promote the prosperity of Canada, and to "assist in the well-working of the new institutions which it has established." In conformity with this pledge, on the 20th of August a message was sent down to the House, enumerating, in one general plan, the different works demanded by the public voice. The total cost was £1,470,000 currency, to be expended in a period of five years. The sum named for the Welland Canal was £450,000. The resolutions confirming the expenditure were carried on the 7th of September, one member only voting against them.

Some efforts were made to increase the size of the Welland to that of the Saint Lawrence Canals. Lord Sydenham, however, shrunk from the expense. He considered that, with the present size of the locks, the Welland could sufficiently compete with the Erie Canal route. Nor was the military view of the question neglected, for a proposal was made to construct locks 56 ft. wide by 280 ft., with 10 ft. depth of water. Although this proposition was rejected, it was wisely determined to construct larger locks at both ends, so that in case of danger, steamers could enter and run some miles inland. The adoption of this plan led to the ultimate enlargement of the succeeding locks to St. Catherines, bringing that town within the navigation proper of the Saint Lawrence. The work was immediately commenced, and the enlarged line, by the way of the Grand River feeder to Port Maitland, was opened in 1845. Consequent upon the progress of the work, the main canal from the junction westward to Lake Erie was laid dry, to give the bottom a width of 26 feet, and to make Lake Erie the feeder. But the failure of several "sets of contractors, and the prevalence of sickness amongst the laborers, retarded the operations so much," says an official account, that this portion of the route was not opened until 1850. It was even then unfinished, and accordingly arrangements were entered into to complete the work by means of dredges. This operation was carried on until 1854, when the contractor abandoned it. In the meantime it was found that the width of 26 feet was totally insufficient for the trade, and it was determined accordingly to increase it to 50 feet. On the other hand, it has been seen that the Grand River supply year by year becomes less, and that the steadiness of that source can not be relied upon; that to keep the Canal so supplied was to run the risk of failure in the navigation; a contingency not even to be thought of without alarm, and against which there could only be one remedy, viz., to turn to Lake Erie as the supply. The consequence has been, that the work is nearly brought to a close, and that the canal throughout has been widened to fifty feet at the bottom, to a level admitting the Lake waters.

The total expenditure up to the 31st of December, 1863, is described in the Public Works Report for that year.

Expended prior to 31st December, 1841	$1,851,427 77
Debentures issued under 7 Vic. c. 34, for payment of back interest on Stock	675,356 42
Amount expended under Department of Public Works, for enlargement, erection of permanent structures, and land damages	4,766,470 70
	$7,293,244 89

"This sum however cannot be considered to represent the cost of the work. It is merely the aggregate of all the vouchers which have been charged to the account of the Canal. Below is appended a statement extracted from the Public Works Reports, of the sums paid for repairs and management for sixteen years. In some instances they are kept distinct, in others the total of the two are shewn. We learn from them, however, that for the last six years, the "management, &c.," averaged about $40,000 per year, whereas in 1850 the cost was $13,500. In the Report of 1849 it was estimated that the future expense of management would be £2,804 ($11,216), and of repairs £2,600 ($10,400).

Year.	Maintenance Repairs and Renewals.	Management.	Total Maintenance and Management.
*	$ c.	$ c.	$ c.
1847	Not given.	Not given.	48,623 00
1848	do	do	Not given.
1849	11,244 91	8,248 82	19,493 73
1850	12,425 21	13,510 19	25,935 40
1851	Not given.	Not given.	49,589 00
1852	do	do	56,802 67
1853	do	do	87,700 00
1854	do	do	99,410 06
1855	do	do	122,379 95
1856	do	do	99,483 65
1857	do	do	108,629 24
1858	61,806 83	42,642 97	104,449 81
1859	37,584 27	40,988 89	78,573 16
1860	Not given.	Not given.	66,312 60
1861	16,932 11	39,807 88	56,739 99
1862	22,120 73	39,129 49	61,250 22
1863	15,392 02	40,855 95	56,248 00
			$1,141,620 57

"The inequality of these amounts does not admit of generalization. Where there are no details to guide, one would conceive it is not possible that maintenance alone would in one year exceed $80,000, and in another be a trifle above $15,000. The inference is, therefore, quite legitimate, that there has been no well considered separation of what should be placed to permanent works and what to repairs, and it is hardly possible to apportion the amount fairly chargeable to capital. One has, therefore, to take an arbitrary mode of arriving at results. We have, however, the authority of the Report of 1863, for stating that about $1,400,000 is chargeable to increasing the depth of water to ten feet on the mitre sills of the locks, and to widening and bottoming the summit level to admit the waters of Lake Erie as a feeder. As this amount has been expended since the Union, and $2,526,884.19 was paid before the Union, we know positively that $3,926,784.19 has been expended totally independent of the main work for the enlargement of the Canal and locks. The Canal may be looked upon as having been opened at the present capacity in 1846, and may be considered to have been in operation 18 years. Unfortunately, in the figures compiled, the greatest expenditures are precisely those, where no distribution has been made. The magnitude of the amounts itself suggests the idea, at the same time, that much has been included as repairs which really was a part of the cost of the construction. It becomes, to some extent, a matter of opinion what these statements really represent. If, however, for these 18 years $50,000 be allowed far management and $300,000 for repairs and renewals, which would be nearly at the rate of $18,000 a year, the approximation arrived at, may claim to be at least theoretically just. The vouchers are still in existence, and those interested in the result can easily disinter them to prove what the repairs really were. Making this reduction of $18,000 from $7,293,244.89 will place the cost at $6,493,244.89, or, in round figures, six and a half millions of dollars.

"The history of this Canal has been very fully given, for unmistakeably it affords its moral; and if there be teaching which in the conduct of public works should lead to the avoidance of error, it is here. We find a small clique of irresponsible men, with no special aptitude, taking possession and to no little extent enjoying all the fruits, of the management of a project, which was national in its character. Their earliest and great idea was definitely to establish the line, and we fear we must conclude that this choice was purely a matter of self-interest. There were no difficulties to bewilder the judgment. Once establish the necessity of connecting the two great Lakes, which everyone recognized, and there was never a plainer or easier question to decide. It was to have made Lake Erie the feeder, to have selected the easiest descent from the upper to the lower level, and to have continued the most direct and best connections with the two Lakes. The Grand River Feeder was in no way necessary: that it should have been at all constructed seems only explained by the apparent economy of its choice, which would weigh with inexperienced men. The least disinterested examination of the ground, and an ordinary calculation of the consequences would have given an answer to the problem. The expense of the dam and the 21 miles of feeder, and additional cost of locks and the unnecessary lockage, ought to have suggested, even to a tyro, that the expenditure would have been greater than deepening by 7 feet, 14 miles of Canal already constructed. For some years past, the fashion has been to speak in complimentary terms, of the energy of those who were most immediately connected with this work. The writer, who traces its history dipassionately, must hold the directly opposite opinion. It is mere assertion that it could not otherwise have been completed. On the contrary, it was a national necessity, and must have commanded attention from the Legislature. The very supposition is grossly unjust to the public men of that day, who, as a rule, warmly supported the work, and sustained it in all the crises through which it passed. The assistance given by Parliament sprung from no other cause than sympathy with the undertaking; and had the country not been taken by surprise, so that the control passed out of the hands of the Legislature into that of a Company,—which in a pecuniary and responsible sense was never anything but nominal,—this Canal must have been constructed by the Government, as the Cornwall Canal was a few years later. As it was, the work was virtually carried on by the Upper Canada Government so far as supplies went, for the total subscriptions to Stock were below £118,000. There cannot be a doubt that had this project been taken up by the Executive, as it ought to have been, both the Imperial Government and that of Lower Canada would have contributed. But this opportunity was forestalled by the few, who laid their grip upon the work only to delay it by incompetency and mismanagement. The consequence is that this work is incomplete at this day. Taking, for the sake of argument, even the present size of the locks as a finality, the Canal must be held as unfinished until Lake Erie is actually the feeder without risk of loss of supply, and there is at least 100 ft. width at bottom; whereas at this moment the width is but 50 feet. That slides and difficulties should have occurred at the "Deep Cut" was caused by want of knowledge. Any engineer knows, that by the help of good drainage and with banks of sufficient slope protected by sods, any cut may be secured; and so much heavy excavation would have occurred here, that it could have been done at a very low rate. The consequence has been, that the work has had to be performed year by year by dredging machines, at great cost, and very slowly, and is even now scarcely completed, forty years after its commencement. It may be asserted that this expense has been necessitated by no new view of the subject; a prudent and reflective mind would have seen its necessity, in the inception of the undertaking. The loss to the country by the recklessness of these men is immense. The Welland Canal has cost as much as the whole of the Saint Lawrence Canals; and it is no exaggeration to estimate that $2,000,000 of money have been wasted in its construction. The locks are 200 x 45 feet against 150 x 26.6 feet, and the canal proper is just double the capacity.

"The present position of this canal is, that it is utterly insufficient for the trade which passes through it. That it must be widened and deepened, and that the locks must be enlarged, is admitted, if it is to become equal to the requirements upon it. Even should the policy of deepening the whole series of Canals be rejected, the Welland must be improved. The question is, to what extent should the enlargement be made? It is urged that much of the craft of Lake Erie cannot now pass the Canal to Lake Ontario; but the argument in this form has no great force. There is a navigation peculiar to Lake Erie which is not met with on Lake Ontario; and the limit to be applied to the Welland Canal must be sought in the navigation of the Saint Lawrence and not in the Upper Lakes—and here we have no identity of view.

Mr. Jarvis, in his Report on the Caughnawaga Canal, places the dimensions of the locks at 10ft. depth of water on sills.	230 x 36 x 10ft.
Mr. Walter Shanly, in his Ottawa Report, takes the "Iowa" as a representative propeller, and proposes..	250 x 50 x 10ft.
Mr. T. C. Clarke in his Report upon this Survey, names................................	250 x 45 x 12ft.
Mr. Kivas Tully, in his Georgian Bay Report, advocates the recognition of 1000-ton propellers, and accordingly specifies.............	265 x 55 x 12ft.

"Be the dimensions what they may, the necessity must be recognized, that two vessels navigating the Canal, may pass at any part of it: hence the width at the bottom must be at least 100 feet. The extent of the improvement will be argued, under the general head of the development of the Saint Lawrence navigation, necessary to command the trade of the Western Lakes. For the moment, all that need be said is, that the enlargement of the Welland is a mere question of extent and finance."

After thus discussing our existing canals, Mr. Kingsford devotes a large portion of his work to a consideration of the various schemes projected within the last few years for the improvement or extension of our canal navigation, generally. These schemes comprise: (1) The Ottawa and French River project; (2) the Chats Canal; (3) the so-called "lateral cut" of the Welland to the town of Niagara; (4) the Toronto and Georgian Bay Canal; (5) the Georgian Bay Canal via Lakes Simcoe and Skugog; and (6) the canal project by the River Trent. To these schemes Mr. Kingsford opposes many strong and apparently well-grounded arguments: holding that not one of these projects, if carried out, would have any extended influence on the trade of the Province. If we cannot accord to him our entire support on this question, we may at least admit that the deepening and general enlargement of our present canals should of necessity precede the execution of new and, in a measure, experimental projects. In a succeeding chapter, much valuable information is given on the present condition and future prospects of the Erie Canal, considered, more especially, in its opposing relations to the St. Lawrence route. The canal question in its more purely financial aspect is then discussed; and the subject of "Tolls, Revenue, and Tonnage" is illustrated by a series of tables, compiled, apparently with great care, from various official records. Finally, Mr. Kingsford concludes his book by a general review of our canal policy in all its bearings. The length to which our present notice has extended, compels us to pass over this portion of the work; but we may commend it cordially to the reader's attention, both for its practical and unprejudiced views, especially in reference to our relations with the United States, and for the large amount of information which it offers in a condensed and exceedingly readable form. The main argument, advocated not only here, but throughout the entire book, may be summed up in the author's own words: "There is only one line of policy to be adopted with regard to our canals: a policy not simply beneficial to Western Canada, but one which will advance the well-being of the whole country. At this moment we have no one generally accepted view as regards the future. We see district struggling against district; the east endeavoring to obtain a monopoly of advantages; the west, sensible of an inferiority and taking no steps to remove it. There is no provincial policy which, without advocacy of local interests, would have in view the development of the material prosperity of the whole, and, at the same time, an increase of the revenue of the public works. Our course of action is suggested by the magnitude of the trade of the Western States, which if turned into its natural outlet, the St. Lawrence, would lead to the important results all yearn to effect. We can gain this trade, if we improve the St. Lawrence, and deepen the canals to 15 feet, and construct a chain of locks 250 feet by 45 feet wide. Here is the true policy for us to pursue. If we fail to follow it, we neglect every advantage, geographical and commercial, that we possess: we shall continue unchanged, and remain discontented and impoverished. If we develope it with ordinary skill and energy, we may hope for better days, for competence, prosperity, and contentment." E. J. C.

THE INDIAN GRAVES OF PERU.

(*From the Panama Star and Herald.*)

The graves and monuments of the New World hitherto examined, unlike those of the Old, have thrown but little light on the ancient history of man. Along with the mummies of Egypt have lately been found a new roll of kings of Egyptian dynasties; while in a mound occupying the site of ancient Babylonia, an inscription has been interpreted relating to the Tower of Babel or Confusion of Tongues, in both cases affecting man's spiritual dignity and religious belief. The graves of the "untutored American Indians" when opened up to the sun show the past generations of living Indians to have been cunning workers in gold, silver, and precious stones, and finely woven textures of cotton cloth, dyed with brilliant hues. But as every Indian descended into the grave with the most precious of his worldly goods around him, we get an insight into his ideas regarding a future state. His favourite *chieha* and provisions suitable for the journey before him, were piously put within reach of his hand, together with various curiously shaped water jugs and coolers; in fact, everything befitting the same rank he must inscrutably occupy in the spirit world—the slaves with nothing, and the women along with the tools of her kitchen drudgery. Among other things of adornment or utility found upon or around the mummy in the graves opened in Arica, were some lenticular bodies, considered to be petrified human eyes, of brownish colour and pearl-like reflections. It is affirmed that they were to be found in the sockets of the eyes, and sometimes on the ground within the trunk. They have been eagerly sought for by all travellers who have visited that locality, and looked on as the curious results of the process of mummification used by these ancient Indians. They are formed of concentric cup-like lamina, peeling off like the coats of an onion on its convex side. While viewed in front, these lamina form concentric circles, diminishing to a round minute ball in the centre, while numerous fine lines run like radii from the centre to the circumference. The form is that of a plano-convex lens, with a diameter of 13-16 of an inch, and a vertical axis of 11-16; its substance is evidently organic, but in no other way has it any affinity to the human eye; with the difference that the striated lines run transverse instead of radial, it exactly resembles the lens of the eye of the shark. Having lately made a dissection of the eye of one of those animals, and hardened the lens in ascetic acid, it assumed almost exactly the appearance of one of those so-called "petrified eyes" which was shown me the other day. My notes made at the time leave no doubt on my mind that they are the lenses of some similar animal, either fossil or modern; any way, it is a question to be decided by the microscope and comparative anatomy. Such being the case, it is useless to discuss how or why it is that Peruvian mummies sometimes have their eyes in their heads and sometimes at their feet.

The following is an extract of a letter from a highly respectable and well known gentleman of Iquique, Wm. C. Billinghurst, Esq., which we have just received, with some very perfect specimens :—

"On my part I have to state that when I was residing in Arica, I was a daily visitor to the scene of the excavations in the Indian burial ground at the foot of the Morro, and witnessed the exhumation of the bodies, many of which were in a perfect state of preservation as mummies. The eyes were generally found in the vicinity of them, and in some instances were *attached to the sockets*, which I think is strong evidence to confirm the belief that they are human."

This letter is accompanied by a scientific report from Dr. Henry Wm. A. Coleman, M.A., of the same place, who is also a firm believer in the eyes being those of Indians. Dr. Coleman gives the following conclusions as the result of his experiment:—

"That they are human eyes in a state of petrefaction, the external tunics have become decomposed and obliterated by time, leaving only the vitreous humours with its membrana Hyoloidea, and having the crystalline embedded in its cup-like excavation or fossa Hyoloidea. By continuous boiling with water the lens becomes separated, and its compact membrane or capsule can be distinctly seen; the nucleus of the lens is easily distinguished; also the subdivisions of its substance showing its three layers concentrically arranged like those of an onion, which by minute examination can be seen to be closely aggregated fibres."—*Glasgow Morning Journal, 23rd February.*

THE PALMS OF WESTERN TROPICAL AFRICA.

The following extract, relating to the economical uses of the palms of Africa, is from a botanical account of the palms of Western tropical Africa, by Gustav Mann and Hermann Wendland, lately published in the Transactions of the Linnæan Society:—

"Throughout the tropics Palms are amongst the most useful plants to mankind; this is more especially the case among people so little advanced in civilization as the natives of West Africa, who obtain from them the source of many of their comforts.

"Foremost among the useful palms of tropical Western Africa stands the *Elæis Guineensis*, Jacq. The oil of the mesocarp of the fruit of this palm constitutes in most parts the chief food of the natives, who hardly ever take a meal in which it is not used in some way or other. It is nutritious and of an agreeable flavour—so much so, indeed, that it generally becomes a favourite dish with Europeans.

"Besides being used as food, the natives also use it for oiling their bodies, partly to keep away insects, and partly as a substitute for clothing, of which they are entirely destitute. The Bubis or Boobees of the Island of Fernando Po make an excellent poultice of it, which they apply when the hand of any person, found guilty of adultery, has, in accordance with the usage of these people, been cut off.

"Among the more civilized natives it is used, as with us, in the manufacture of soap; and it is also employed for lighting their huts, but the oil extracted from the kernel of the nut is generally preferred for this purpose.

"The exportation of the seeds of this palm is rapidly increasing, and already large quantities are shipped from Sierra Leone and its neighbourhood.

"Were there less jealousy and more energy among the European traders, and could they induce or force the natives of the coast to give up their monoply, much larger supplies could be obtained at the chief sources of the trade, as at Bonny, Brass, and Old Calabar Rivers, and this oil would be found much superior to that now obtained from the mesocarp of the seeds.

"Elæis wine, a drink much liked by the natives, is obtained by cutting off the male flower-spike ; this wine is also used by the Europeans instead of yeast in making bread. The main nerves of the pinna and the exterior of the petiole are used for basket-work, for the making of brooms, and similar purposes. Dr. Welwitsch says that at St. Paul de Loando the fibre at the base of the leaves, and also that of the spathe, is used for stuffing cushions, &c.; the soft centre of the upper part of the stem, consisting of the undeveloped petioles, is much relished as a vegetable. Finger-rings, bracelets, necklaces, and other ornaments are cut from the endocarp of the seed. Many as are the benefits derived from this palm by the natives, they are comparatively few compared with the uses made of its products by Europeans ; of these we need not speak, as all must be more or less acquainted with them. It may, however, be worthy of mention that during the last three years 130,381 tons of palm oil, of the value of £5,605,913 have been imported into Great Britain.

"With regard to their utility to the natives, the various species of *Raphia* rank next to the *Elæis*. The petioles furnish the materials of which their huts and beds are made, while the pinnæ are used for roofing ; and the epidermis of the leaflets gives the material from which their clothing is made. In places where the *Elæis* is scarce, the oily substance between the scaly exterior of the fruit and the kernel, although bitter, is eaten with yam, cassada, &c., and the oil pressed out of it is by the women thought superior to that of the *Elæis* for dressing their hair.

"The pleasant taste of the wine obtained from *R. Hookeri* has even been sufficient to overcome the innate idleness of the natives of Old Calabar, and has induced them to cultivate it. The wine is procured by cutting out the terminal inflorescence as soon as it makes its appearance; the wine is then produced in large quantities. The natives of Old Calabar manufacture cloths, &c., from the epidermis of the leaflets of this palm, and in the south, at St. Paul de Loando, *R. Welwitschi* is used for the same purpose, and the petioles of *R. vinifera* are employed as poles upon which to carry the palanquins. On the river Sherboro the natives make hammocks from the former material, as well as all sorts of basket-work, mats, &c. The roofing made of the leaflets of *R. vinifera* lasts for three years, while that made from *R. Hookeri*, it is said, requires to be renewed every year.

"Wine is also obtained from *Phœnix spinosa*, and the fruits of this palm are much liked by the natives. The very young leaflets, before the leaves expand, are used for the plaiting of hats and caps at Accra.

"The outer part of the stems of the climbing palms of Western tropical Africa is used for binding together the materials of which the huts are constructed. The Banfan people also make large cylindrical baskets of this in which to carry the rubber manufactured by them, and the same people take large quantities of *Calamus* (*Ancistrophyllum*) *secundiflorus* with them as food when they go into the hills of the Sierra del Crystal to procure rubber. For this purpose they choose the extremities of the stem, cutting off the leaves to make the bundles more portable, and when required for use they simply roast the whole in the fire and then eat the soft central part, which is, however, rather bitter and tough for persons not accustomed to such primitive fare.

"The fruits of *Podococcus* are also eaten. The leaves of *Sclerosperma* are used for roofing and constructing the walls of the huts, being tied between the petioles of *Raphia*."

CANADIAN INSTITUTE.

ANNUAL REPORT OF THE COUNCIL FOR THE YEAR 1864.

The Council of the Canadian Institute have the honour to present the following Report of the Proceedings of the Society for the past year:

I. MEMBERSHIP.

The present state of the Membership is as follows:—

Members, commencement Session 1863, 1864		445
New Members elected Session 1863, 1864		13
Total		458
Deduct deaths	7	
Withdrawn	21	
Left the Province	11	
For non-payment of Subscription	19	
		58
Total 30th November, 1864		400
Composed of Honorary Members	4	
Life Members	32	
Corresponding Members	6	
Junior Members	1	
Members	357	
Total		400

II. COMMUNICATIONS.

The following list of Papers, read at the Ordinary Meetings during the Session, will be found to contain many communications of value, and some of general interest:—

5th December, 1863.

Rev. Prof. W. Hincks. F.L.S., &c.: "Notice respecting Welwitschia, a newly discovered African plant; being an abstract of Dr. J. D. Hooker's paper in the Linnæan Society's Transactions, with a few remarks."

Prof. Chapman, Ph.D.: "On the detection of ordinary metals in mineral bodies, by aid of the common blowpipe, and other cheap, portable, and easily procurable apparatus, with illustrative experiments."

12th December, 1863.

Rev. J. McCanl, LL.D., President: "On ancient Glandes."

B. R. Morris, M.D.: "Exhibited and made some remarks on the insects captured during the last summer by him."

9th January, 1864.

Rev. J. McCaul, LL.D., President: "The President's Address."

Prof. G. T. Kingston, M.A.: "On the annual and diurnal distribution of the wind at Toronto."

16th January, 1864.

A. M. Rosebrugh, M.D.: "On the Ophthalmoscope, a new instrument for viewing and photographing the deep structures of the living eye, with illustrations."

J. B. Clarke, Mus. Bac.: "On a new method of propelling steam vessels and canal barges."

23rd January, 1864.

Rev. Prof. W. Hincks, F.L.S.: "Continuation of observations on the systematic position and affinities of certain tribes of birds. The Fissirostral group."

James Hubbert, Esq., B.A.: part of a paper "On the latex and laticiferous vessels of plants."

30th January, 1864.

Rev. H. Scadding, D.D.: "Remarks on the Greek and Roman coins in the collection of the Institute."

6th February, 1864.

D. Tucker, M.D.: "On certain modern views concerning the ordinal arrangement of the higher mammalia."

13th February, 1864.

Prof. E. J. Chapman, Ph.D.: "Comparative anatomy and geological relations of the Archæopteryx."

20th February, 1864.

Prof. E. J. Chapman, Ph.D.: "A short communication on the Allanite."

Rev. J. McCaul, LL.D., President: "Remarks upon the Roman army of occupation in Britain."

27th Frbruary, 1864.

Prof. G. T. Kingston, M.A.: "On the abnormal variations of the meteorological element at Toronto, and their relation to the direction of the wind."

5th March, 1864.

Prof. D. Wilson, LL.D.: "On some of the supposed traces of human art in the post pliocene strata."

12th March, 1864.

Prof. E. J. Chapman, Ph.D.: "On a peculiarity connected with the presence of phosphorus in iron wire."

Prof. E. J. Chapman, Ph.D.: "On certain distinctive characters of the Rhizopoda."

19th March, 1864.

Prof. G. T. Kingston, M.A.: "On the relative duration of different winds during rain or snow, derived from the Toronto observations, in years 1853 to 1859, inclusive."

Rev. Prof. W. Hincks, F.L.S., &c.: "Additions to Canadian Flora."

Prof. J. B. Cherriman, M.A.: "On the geometrical trisection of an angle."

2ND APRIL, 1864.

Rev. H. Scadding, D.D.: "On Errata Recepta, written and spoken."

9TH APRIL, 1864.

U. Ogden, Esq., M.D.: "On quackery, and a novel remedy for the treatment of certain chronic diseases."

16TH APRIL, 1864.

D. Tucker, Esq., M.D.: "On secluded tribes of uncivilized men."

A. M. Rosebrugh, Esq., M.D.: "On a modification of the Opthalmoscope."

Prof. D. Wilson, LL.D.: "On the Canadian type of the French skull."

APPENDIX.

DONATIONS OF BOOKS, MAPS, &c., SINCE LAST ANNUAL REPORT

Marked thus (*) not bound, or pamphlets.

FROM HON. J. M. BRODHEAD, WASHINGTON, D. C., U. S.

Report on the construction of a Military Road from Walla-Walla to Fort Benton. By Capt. John Mullen, U.S.A. Washington, 1863	1
Diplomatic Correspondence, year 1863. Parts 1 and 2	2

FROM JOHN LOVELL, PUBLISHER, MONTREAL.

The North British Almanac, and annual record for 1864. Vol. I	1

FROM THE ROYAL GEOGRAPHICAL SOCIETY, LONDON.

*The Quarterly Journal, Vol. 18, Nov. 1st, 1862, No. 72, part 4	1
" " Vol. 19, Feb. 1st, 1863, No. 73, part 1	1
" " " May 1st. 1863, No. 74, part 2	1
" " " August, 1863, No. 75, part 3	1
" " " Nov., 1863, No. 76, part 4	1
*List of Members, Nov. 1, 1862	1
*Charter and By-Laws	1

FROM THE ROYAL ASIATIC SOCIETY OF GREAT BRITAIN AND IRELAND.

*Journal of, Vol. 20, part 1; Vol 20, part 2	2

FROM THE SOCIETY.

*Transactions of the Royal Society of Edinburgh, Vol. XXIII., part 2, session 1862–63	1

FROM THE SECRETARY OF STATE FOR INDIA.

Magnetical and Meteorological Observations. Bombay, 1861	1
" " " Bombay, 1862	1

FROM CLERK OF LEGISLATIVE ASSEMBLY OF CANADA.

Journal of the House of Assembly, Nova Scotia, 1863	1
*Transactions of the Nova Scotia Institute of Natural Sciences	1
The Statutes of Canada, 1863	1

Statutes of Canada, 1864 1

FROM THE NATURAL HISTORY SOCIETY OF CHICAGO.

Transactions of the Illinois State Agricultural Society. Vols 3 and 4........ 3
Abstract of a Report on Illinois Coal. By J. G. Norwood, M.D.S., Geologist. 1

FROM THE SOCIETY, SCOTLAND.

*Proceedings of the Royal Physical Society of Edinburgh. Sessions 1858–9, 1859–60, 1860–61, and 1861–62 2

FROM THE REGENTS OF THE UNIVERSITY OE THE STATE OF NEW YORK.

Sixteenth Annual Report. Appendix D. Copies........................

FROM THE SMITHSONIAN INSTITUTE, WASHINGTON.

Report for 1862 1
Contributions to Knowledge. Vol. XIII.................................. 1
*Miscellaneous Collections. Vol. V....................................... 1
*Verhaudlingen der Karserlish Komglischen Zoologisch-Botanischen Gescelschaft in Wien, &c., 1863. XIII. Band 1
Meteorologische Waarnemungen in Nederland in Zyne Bezittengen in afwykingen van Temperature en Baromete stand op vele Plaattsen in Europa, uitgevere door het Komrdclijk, Nederlandsch Meteologisch Institut, 1862. 1

FROM SIR W. LOGAN, F.G.S., MONTREAL.

The Geology of Canada, 1865 1

FROM JAMES HUBBERT, ESQ., M.A.

Ancient Gems, from the collections of Earl Percy, Hon. C. T. Greville, T. M. Slade 1

FROM THE AUTHOR.

Chapman's Minerals and Geology of Canada................................ 1

FROM PROF. G. T. KINGSTON, M.A., SUPT. OF THE MAGNETIC OBSERV., TORONTO.

Abstracts of Meteorological Observations made at the Magnetical Observatory, Toronto, C. W., during the years 1854 to 1859, inclusive................ 1
Results of Meteorological Observations made at the Magnetical Observatory, years 1860, 1861, and 1862... 1

FROM THE COMMISSIONER OF PATENTS, D. POLLOWAY, WASHINGTON.

Patent Office Reports, 1861. Vol. I.—Arts and Manufactures............. 1
Vol. II.— Do do Illustrations .. 1
Introductory Report of Commissioner of Patents for 1863.................. *1

FROM CHIEF SUPERINTENDENT OF EDUCATION, LOWER CANADA.

Journal de l'Instruction Publique, years 1862 and 1863.................... 2
Journal of Education, Lower Canada, years 1862 and 1863 2

FROM THE AUTHOR, LIEUT.-COL. GRAHAM, U. S. TOPOGRAPAICAL ENGINEERS.

Report for 1857 on Lake Harbors, &c.. 1
Do 1858 do do 1
Report on Mason and Dixon's Line *1
Do of the Topographical Bureau for year 1863............................ *1
Do Annual, 1860, Lake Harbors, Improvements, Geographical Positions, Lake Lunar Tides... 1

From Patrick McGregor, Esq., Barrister, Toronto.

Traite de la Résolution des Equations Numériques de Tous les Degrés. Par J. L. Lagrange. 1826	*1

From Literary and Philosophical Society, Liverpool.

Proceedings of, 1862–63. No. XVII.	*1

From Literary and Philosophical Society, Leeds.

Transactions, Vol. I., Part 1, 1837	1
Reports of the Council from 1825–6 to 1862–3	*30
Proceedings of, from 1840 to 1862	*23
Sensorial Vision, a paper by Sir J. F. Heachett, Bart., 30th September, 1858.	*1
China and its Trade, a paper read by John Crawfurd, F.R.S., 17th Nov. 1858.	*1
The Physical Condition of the People, a paper read by the Right Rev. R. Bickersteth, D.D., F.R.S., Bishop of Ripon, 17th Jan. 1860	*1
Laws and Regulations of the Society, 1862	*1
The Relations of Science to Modern Civilization, by Professor Hennessy, 7th January, 1862	*1
Inaugural Address by Professor Owen, F.R.S., 16th December, 1862	*1

From the Linann Society.

Journal of the Proceedings, Botany, Vol. VII., Nos. 27 and 28; Vol VIII., Nos. 29 and 30	*4
Do do Zoology, Vol. VII., Nos. 27 and 28; Vol. VIII., No. 29	*3
The Annual Address, 1863 and 1864	*2
List of the Society for the year 1863	*1

From the Geological Survey of India, per Dr. Oldham.

Memoirs Palæontologia Indica, 3, 2–5. The Fossil Cephalopoda of the Cretaceous Rocks of Southern India (Ammonitidæ), by F. Stoluzka, Ph.D.	*1
3–1 do do do do	*1
2–6, The Fossil Flora of the Rajmahal Series, Rajmahal Hills, by Thomas Oldham, Superintendent of Geological Survey of India, and J. Morris, Professor of Geology, University College, London	*1
The Annual Report of the Geological Survey of India, 1862–3	*1

DONATIONS OF PAMPHLETS, SHEETS, &c.

From T. C. Wallbridge, M.P.P.

Le Bougesome en Canada	1
Explorations de Quebec et Lac St. Jean. Par J. Perrault	1
Correspondence, Documents, Evidence, and Proceedings in the Enqniry of Messrs. Lafrenaye and Doherty, Commissioners, into the office of the Clerk of the Crown and Clerk of the Peace, in Montreal	1
Supplementary Catalogue of the Library of Parliament—Books added to the Library, since 12th February, 1863	1
List of Bills introduced in the Legislative Assembly, or brought from the Legislasive Council, during last Session (1st Session, 8th Parliament) with a statement of the stage at which Proceedings were suspended at the Prorogation	1

Supplementary Catalogue of the Library of Parliament—Pamphlets	1
History of the Grand Trunk Railway of Canada. By T. S. Brown. 1864	1
Fifth Annual Report of the Montreal Fish and Game Protection Club, March, 1864	1
Report of the Trade and Commerce of the City of Montreal for 1863	1
Four Parliamentary Papers, Toronto Esplanade, &c	4
Reasons against the Bill respecting the Ottawa and Prescott Railway Company	1
Catalogue de la Bibliotheque, &c., de Sir L. H. Lafontaine, Bart., Juge en chef, &c	1
Report of the Select Committee on Reporting the Debates of both Houses of the Provincial Parliament	1
Census of the Province of New Brunswick, 1861	1

From J. W. Dawson, F.G.S., the Author.

Synopsis of the Flora of the Carboniferous period in Nova Scotia	1
Further observations on the Devonian Plants of Maine, Gaspe, and New York	1

From Harvard University, Cambridge, U.S.

List of Nebulæ and Stars-clusters seen at the College, Observatory 1847–1863.	1
On the new Form of the Achromatic Object Glass introduced by Steinheil. By G. P. Bond, Director of the Observatory	1
Report of the Committee of Overseers, 1863	1
The Right Ascension of the Pole Star. By T. H. Safford, O.H.C	1
Catalogue of the Officers and Students of Harvard University, 1864–5, 1st Term	1

From Mr. Edward Allen, London, per Dr. Ogden, Toronto.

Catalogue of Curious and Rare Books	7
Do do do	3

From Natural History Society of New Brunswick.

Fourth Annual Report of the Board of Agriculture of the Province of New Brunswick	1

From Education Office, Toronto.

Jugement Errone de Ernest Renan, sur les langues Savages. Par N. O.	1

From Professor Cherriman, M.A.

The Total Eclipse of July 17, 1860. Published under authority of the Hon. Isaac Toncey, Secretary of the Navy, by the Nautical Almanack. 1860.	1

From A. M. Rosebrugh, M.D.

A new Opthalmoscope for Photographing the Posterior Internal Surface of the Living Eye, with an outline of the Theory of the ordinary Opthalmoscope	1

From McGill College, Montreal.

The Faculty of Medicine, years 1864–5	1
McGill University, Montreal, 1864–5	1

From the Geological Survey of India, per Smithsonian Institute.

Memoirs of Survey of India, Part 3, Series 2	1
Do do Part 4, Series 2	1
Do do Part 5, Series 2	1

From Rev. S. Haughton, M.A., F.R.S., Author, per Smithsonian Institute.

Essay on Comparative Petrology, by M. J. Durocher. Translated	1
On the Phenomenon of Diabtes Mellitus	1
Account of Experiments made to determine the Velocity of Rifle Bullets commonly used	1
The use of Nicotine in Tetanus and cases of Poisoning by Strychnia	1
On the Form of Cells made by various Wasps and by the Honey Bee, &c	1
Experimental Researches on the Granites of Ireland, Part III. Donegal	1
Rain Fall and Evaporation in Dublin, year 1860	1
On the Deviation and Force of the Wind in Leopold Harbor	1

From Laval University.

Annuaire de l'université Laval pour l'Anne academique, 1864–5	1

From the Author, George Lawson, Ph.D.

Synopsis of Canadian Ferns and Filicoid Plants	1

From B. Workman, Esq., M.D.

Report of the Provincial Lunatic Asylum. Toronto, 1863	1

From Dawson Brothers, Montreal.

The Northern Kingdom. By a Colonist	1

Unknown.

Charles Desilvers' Descriptive Catalogue of Books, Philadelphia	1

From Bernard Quaritch, London.

Catalogues of Works of Art and Curious and Rare Books	10
The Crown and the Confederation. Three Letters to Hon. J. A. Macdonald. By a Backwoodsman	1

From Office of Routine and Record.

Report of the Select Committee on Immigration	1

From Professor Kingston, per Royal Society, London.

Bericht liber die Thätigkect der St. Gallischen Naturwissenschaftlichen Gisillschaft während des Verinsjahars, 1862–63. Redaktor Prof. Dr. Wartman	1

From the Society.

The Transactions of the Nova Scotian Institute of Natural Science. Vol. II. Part 1. 1864	1

In Exchange for Journal.

The Journal of Education for Upper Canada, 1864 (Duplicate.)	1
The Journal of the Franklin Institute, Philadelphia, 1864	1
The Antijan, London, 1864	1
The Journal of the Society of Arts, 1864 (Duplicatory)	1
Silliman's American Journal, 1864	1
Canadian Naturalist and Geologist, 1864	1
Proceedings of the Boston Natural Historical Society, 1864	1
Proceedings of the Academy of National Sciences, Philadelphia, 1864	1
Historical Recollections of the Essex Institute, 1864	1

Annals des Minas, &c., France.	
Tome IV. 5 Liv. de, 1863	1
6 Liv. de, 1863	1
V. 1 Liv. de, 1864	1
2 Liv. de, 1864	1
Bulletin de la Société Géologique de France.	
Deuxieme Série Tome Dix-Huitieme Feulles 7–12 (17 Dec., 1860—3 Fev. 1861	1
Deuxieme Série Tome Vingtieme Feulles 6-12 (1 Dec., 1862–12 Jan., 1863)	1
Do do do 13-20 (12 Jan.—13 April, 1863)	1
Do do do 21-30 (13 Avril—18 Mai, 1863)	1
Do do do 31-48 (18 Mai—22 Juin, 1863)	1
List of Members, 1st May, 1863	1
Proceeding of American Antiquarian Society Boston, April 7, 1864	1
Annals of the Lyceum of Natural History, New York, 1864	1
Journal of the Board of Arts and Manufactures, 1864	1
Proceedings of the Natural History Society, Dublin.	
Vol. 3, Part 1, 1859–60	1
" 3, " 2, 1860–62	1
" 4, " 1, 1862–63	1
Anthropological Review, 1864	1
The Journal of the Royal Dublin Society, Nos. XXIX., April, 1863	1
XXX., July, 1863	1
XXXI., Oct., 1863.–July, 1864	1
The Journal of the Geological Society of Dublin, Vol. IX., Part 2, 1861–62	1
Vol. X., " 1, 1862–63	1
Transactions of the Literary and Historical Society Quebec, New Series, Part 2, 1863–4	1
Transactions of the Royal Scotish Society of Arts, Vol. VI., Part 3, 4 March, 1864	1

BOOKS PURCHASED.

Words and Places. By Rev. J. Taylor	1
Coins, Medals and Seals, Ancient and Modern. Illustrated. Edited by W. C. Prime	1
The Works of Francis Bacon. Vols. 8, 9 and 10	3

DONATIONS RECEIVED FOR THE MUSEUM.

PRESENTED BY THE GOVERNOR OF N. BRUNSWICK, PER S. FLEMING, ESQ.

"Albertite" found in Albert County, New Brunswick,—Specimens.	1
"Gypsum" do do do do	1
"Iron Ore" from Acadian Mines, Nova Scotia. do	3

PRESENTED BY J. LAIDLAW, ESQ., PER S. SPREULL, ESQ.

"Coal" from Durm Mountain, New Zealand.—Specimens	1

PRESENTED BY S. FLEMING, ESQ., CIVIL ENGINEER.

"Gypsum" from Tobique River, New Brunswick.—Specimens	1

STATEMENT OF THE GENERAL ACCOUNT OF THE CANADIAN INSTITUTE FOR THE YEAR 1863-64, FROM 1ST DECEMBER, 1863, TO 30TH NOVEMBER, 1864.

DR.

Cash balance last year	£221	19	1
" received from Members	152	0	1
" " for Journal	46	5	0
" " for Interest	46	10	0
" " for Rent	20	7	6
" " Don. for Building	0	5	0
" " Parliamentary Grant	187	10	0
" due by Members	430	1	3
" due for Old Journals	28	11	3
" " New Journals	10	16	3
	£1144	5	4

CR.

Cash paid on account of Journal, 1863	£118	15	6			
" " " " 1864	110	7	3			
				£229	2	9
" " " of Library and Museum				50	12	8
" " " of Sundries				191	0	7
" " " of Building				57	14	6
" due on account of Journal 1864				50	0	0
" due on account of Sundries				25	0	0
" due on account of Library				1	0	0
Estimated Balance				539	14	10
				£1144	5	4

The Treasurer in account with the Canadian Institute, year 1863–1864, *from* 1*st December*, 1863, *to* 30*th November*, 1864.

Dr.

Cash Balance last year	£221	19	1
" Interest received on Loans	46	10	0
" From members	152	0	0
" on account of Journal	46	5	0
" on account of Rent	20	6	6
" on account of Building Fund	0	5	0
" Parliamentary Grant	187	10	0
Securities	775	0	0
	£775	0	0

Cr.

	£	s.	d.	£	s.	d.
Cash paid on account of Journal, 1863	£118	15	6			
" " " " 1864	110	7	3			
				£229	2	9
" " " of Library and Museum				50	12	8
" " " of Sundries				191	0	7
" " " of Buildings				57	14	6
Securities				775	0	0
Balance in Bank				146	6	1
				£1449	16	7

Statement of the Building Fund.

Dr.

	£	s.	d.
Balance last year	£1569	2	5
Interest on Loan, £775, @ 6 per cent	46	10	0
Donation from Capt. Walker, Barrie	0	5	0
Rent, 15th February to 15th September, 1864	23	6	6
Subscriptions (not collected)	534	15	0
	£2173	18	11

Cr.

	£	s.	d.
Repair of House	5	14	6
Commission, £23 6s. 6d., Rent collected	1	3	5
Taxes paid back to Mr Haxworth	1	15	9
Insurance, $1800, to 18th Sept. 1865	9	0	0
J. Smith, Architect, for plans, specifications, and receiving tenders for proposed New House	40	0	0
Freeland & Whitley, for leasing House to Mr. Reid	3	0	0
Balance	2113	5	3
	£2173	18	11

Toronto, 29th Nov., 1864.

Vouchers compared with Cash Book, and found correct. Balance due by Treasurer, one hundred and forty-five pounds.

Samuel Spreull, } *Auditors.*
G. H. Wilson, }

MEDICAL SECTION.

Since January 13th, 1864, ten meetings have been held, at which the following communications were read bp the respective authors.

1. "On the Variola, Varioloid and Vaccinnation."—Dr. Agnew.
2. "On the Therapeutic action of the Alkalies in Inflammatory Diseases."—Dr. C. B. Hall.
3. "On the Opthalmascope."—Dr. Rosebrough.
4. "On the complications of Pertussis."—Dr. Tucker.
5. "On the Views of Brown Sequard regarding the quantity of Fibrine in the blood."—Dr. Barrett.
6. "On some difficulties of Diagnosis."—Dr. C. B. Hall.
7. "On the treatment of Pertussis by Bromide of Ammonium."—Dr. O'Dea.
8. "On a new method of treating the Peduncles of Ovarian Tumours."—Dr. Lizars.
9. "On the treatment of Cholera Canadensis by Hyprodermic Injections of Morphia."—Dr. Ross.

REPORT OF THE EDITING COMMITTEE OF THE CANADIAN JOURNAL.

To the Council of the Canadian Institute:—Your Committee can make but little variation on the form of Report which has been presented in previous years, the method of conducting the Journal having undergone no change during the present year of publication. They trust that its reputation has not been diminished, nor its usefulness impaired; and they are led to believe, from the notices of it by European publications, and the enquiries made for it in Europe, that it is becoming increasingly known and appreciated beyond the limits of the Province. The number of original communications printed has been twenty, many of which the Committee believe to be of permanent value; and while the department of Reviews has not been neglected, a further extension has been given to the translation of articles of general interest from foreign scientific periodicals, which are not accessible in their original form. In this department the Committee thankfully acknowledge their obligations for valuable services rendered by the following gentlemen: M. Barrett, Esq., M.D., Thos. Moss, Esq., M.A., and J. Campbell, Esq., of University College, Toronto.

In accordance with the recommendation of the Council, the issue of the Journal has this year been reduced to 500 copies, and this, together with other circumstances, has led to a diminution of the cost of publication to the extent of about $400, the total expense for the year having been $886. The issue is, however, still in excess to the requirements of the Institute; and your Committee would respectfully suggest to the Council a consideration of the propriety of closing the present series of the Journal, which has now extended over nine years, and of placing the publication thereof on a different footing.

All which is respectfully submitted,

J. B. Cherriman, *General Editor.*

REPORT OF THE LIBRARIAN ON THE CANADIAN INSTITUTE, FOR THE YEAR 1864.

No changes have been made in the arrangement of the Library during the year. Accommodation more ample for the annually increasing number of volumes will be provided in the building to which the Institute purposes shortly to remove. The additions to our shelves by purchase, indeed, have not been many, our resources available for that purpose being limited; but the collection continues to be enlarged and enriched by the transmission to it of the valuable publications periodically put forth by scientific and literary societies in Europe, British America, and the United States. These consist, this year, of about forty unbound volumes or parts, including especially four late Reports of the Geological Survey of India, with very fine illustrative plates; and about thirty pamphlets, to which are to be added (in parts) a set of the Annual Reports of the Leeds Philosophical and Literary Society, from 1830 to 1863; also a set (in parts) of the Preceedings of the Geological and Polytechnic Society of the West Riding of Yorkshire, from 1840 to 1862; and ten parts of the Journal of the Proceedings of the Linnæan Society, completing the set in the possession of the Institute to 1864. The Reports and Transactions just enumerated are principally in exchange for the Journal published by the Canadian Institute.

Several parliamentary and public official documents have also been forwarded to the Institute, by the kindness and attention of Members of the Provincial Legislature.

The volumes of the Library, to which reference was made in the last Annual Report as having been too long out on loan among the members of the Institute have, in the majority of instances, been returned.

In conclusion, the Librarian has pleasure in adding that he has prepared a new catalogue of all the pamphlets in the possession of the Institute. In it, he has classified them by subjects, leaving spaces for the entry of future acquisitions. This will facilitate their being bound up in volumes at some subsequent time.

H. Scadding, *Librarian.*

November 26, 1864.

In presenting their last Report, the Council had occasion to express their regret at the loss of the services of their Recording Secretary, Patrick Freeland, Esq., through severe illness. They have now to perform the melancholy duty of reporting his death, which occurred in May last, [1864] and, in doing so, they desire to record the deep sense which they entertain of the loss sustained by the Institute in the death of so valuable an officer, and of one who always manifested so warm an interest in its welfare.

The Council have also to record their regret that George A. Wilson, Esq., who was appointed the successor of Mr. Freeland, was also compelled to resign his office through illness. The Council thereupon appointed Mr. W. M. Clark to discharge the duties of Secretary, *ad interim.*

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST.—APRIL, 1865.

Latitude—43 *deg.* 39.4 *min. North.* *Longitude*—5 *h.* 17 *min.* 33 *sec. West.* *Elevation above Lake Ontario,* 108 *feet.*

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resultant Direction.	Velocity of Wind.					Rain in Inches.	Snow in Inches.
	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M	2P.M.	10PM	ME'N		6 A.M	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A.M.	2 P.M.	10 P.M.		6 A.M	2 P.M	10PM	Re-sul't.	ME'N		
1	29.218	29.366	29.584	29.4048	°36.3	°42.8	°37.8	°39.15	+ °2.92	.151	.196	.148	.165	71	70	65	68	W	N W	W N W	N 60° W	13.5	27.6	12.4	14.85	15.27	...	...
2	.697	.734	—	—	30.2	45.0	—	—	—	.142	.140	—	—	84	47	—	—	Calm.	S S W	N WbN	S 69 W	0.0	9.2	2.1	1.90	3.74	...	...
3	.862	.848	.828	.8473	34.9	49.7	42.5	42.95	+ 5.93	.117	.105	.147	.129	57	29	54	47	N b W	E b N	E	N 77 E	1.2	13.5	12.5	9.92	10.18	...	...
4	.810	.799	.772	.7910	39.9	50.4	44.6	45.33	+ 8.00	.174	.257	.274	.236	70	70	93	78	E b N	E b S	S E	S 78 E	7.2	7.5	1.0	4.57	4.98	0.330	...
5	.755	.670	.583	.6667	41.7	54.4	50.0	49.30	+11.65	.228	.287	.345	.288	85	67	96	81	S E	E S E	E b N	S 76 E	2.5	6.0	0.4	3.01	3.20	0.080	...
6	.511	.380	.437	.4353	50.4	57.3	48.2	51.95	+13.92	.340	.347	.255	.313	93	73	75	80	S	S S W	S W b W	S 39 W	10.0	14.2	5.8	10.32	10.75	0.030	...
7	.571	.701	.862	.7258	40.3	41.4	34.5	38.68	+ 0.27	.133	.127	.166	.135	52	48	83	58	S W b W	W b N	W b S	S 79 W	12.0	26.5	10.6	15.86	16.30	...	...
8	.942	30.013	30.092	30.0248	30.9	34.9	29.1	31.58	— 7.13	.157	.117	.126	.125	90	57	78	71	W b S	W N W	N N W	N 71 W	4.0	8.0	9.0	7.47	7.82	...	Inp.
9	30.156	30.064	—	—	25.2	35.3	—	—	—	.115	.104	—	—	85	51	—	—	N N W	E b S	N E b E	N 82 E	3.4	8.0	0.7	4.81	5.18	...	1.0
10	29.801	29.764	29.810	29.7923	32.0	37.8	36.7	35.37	— 4.05	.166	.183	.197	.181	91	80	90	87	N E b N	N N E	Calm.	N 33 E	6.2	4.0	0.0	2.19	2.28	...	1.0
11	.814	.678	.434	.6355	33.4	38.1	40.7	37.63	— 2.10	.171	.195	.241	.206	89	85	95	91	N b W	E b N	E N E	N 75 E	1.5	13.0	12.0	8.51	8.56	0.500	...
12	.008	.097	.448	.1965	46.1	53.3	38.5	45.47	+ 5.33	.305	.202	.148	.219	98	49	63	71	E	W b S	W N W	S 76 W	0.8	44.3	22.2	17.46	19.40	Inp.	...
13	.608	.619	.682	.6475	33.1	42.1	39.9	39.40	— 1.03	.167	.177	.198	.177	88	66	80	73	W b N	S S W	S W b W	S 44 W	0.5	8.0	6.4	5.82	6.46	Inp.	...
14	.753	.738	—	—	36.3	53.3	—	—	—	.143	.240	—	—	66	58	—	—	W S W	S b W	W b N	S 31 W	2.5	10.0	0.2	3.64	3.83	Inp.	...
15	.658	.401	.358	.4615	41.0	51.8	43.5	45.62	+ 4.57	.218	.239	.205	.228	85	62	80	76	Calm.	S S E	Calm.	S 42 E	0.0	2.2	0.0	0.28	0.41	0.260	...
16	.333	.634	—	—	43.2	36.7	—	—	—	.262	.146	—	—	94	67	—	—	E b S	N W	Calm.	N 36 W	2.0	19.2	0.0	11.69	12.29	Inp.	Inp.
17	.875	.762	.530	.7060	28.4	42.5	35.6	36.35	— 5.40	.112	.199	.167	.166	73	73	80	76	Calm.	S E b E	E b N	S 68 E	0.0	9.0	1.6	3.39	3.94	Inp.	...
18	.200	.346	.643	.4090	39.6	59.8	45.7	48.07	+ 6.00	.194	.136	.194	.178	79	26	62	58	E b N	W	W N W	N 86 W	1.0	33.0	2.8	13.62	14.40	0.025	...
19	.800	.886	.836	.8457	38.5	47.2	42.5	43.02	+ 0.67	.164	.192	.218	.192	70	59	80	69	Calm.	S S E	E N E	N 81 E	0.0	0.5	6.0	6.74	7.52	...	...
20	.712	.613	.600	.6285	40.7	37.4	40.7	39.82	— 2.97	.111	.154	.250	.183	44	69	98	74	E bN	E b N	E N E	N 72 E	22.2	18.0	13.5	14.70	14.74	0.720	...
21	.466	.305	.263	.3355	42.1	52.2	51.1	48.40	+ 5.30	.259	.337	.352	.313	96	86	94	92	E N E	E N E	S E b E	N 85 E	12.0	7.2	0.8	2.46	7.31	0.270	...
22	.314	.299	.402	.3405	44.3	45.7	37.1	41.87	— 1.50	.230	.149	.141	.165	79	47	64	61	S W	S W	W b S	S 64 W	9.8	21.0	19.8	17.16	17.54	0.010	Inp.
23	.478	.514	—	—	33.1	43.9	—	—	—	.123	.112	—	—	65	38	—	—	W b S	W b S	W N W	N 89 W	18.0	13.0	2.4	11.31	11.62	...	Inp.
24	.765	.811	.827	.8128	33.4	49.3	43.2	42.88	— 1.12	.141	.173	.190	.163	74	49	68	59	W N W	S S W	Calm.	S 51 W	8.5	11.2	0.0	3.22	4.37	...	...
25	.874	.816	.750	.8067	42.1	50.8	40.3	44.08	— 0.32	.204	.163	.193	.184	76	44	77	65	N E bN	E b S	Calm.	N 83 E	4.5	5.0	0.0	4.01	4.13	...	...
26	.655	.561	.574	.5957	38.9	55.1	54.0	51.20	+ 6.50	.194	.343	.271	.276	81	78	65	72	Calm.	S W b S	N WbN	N 80 W	0.0	8.4	7.5	3.01	5.41	0.090	...
27	.678	.673	.665	.6733	45.4	51.5	45.7	47.88	+ 2.87	.143	.145	.184	.162	47	38	59	49	NW bN	S b W	N b E	N 6 W	0.5	2.0	4.8	3.90	6.26	...	...
28	.696	.726	.539	.6363	45.3	45.4	43.5	44.97	— 0.43	.226	.243	.268	.253	75	80	95	85	N	E S E	E b N	N 70 E	9.8	1.4	15.5	7.34	8.68	1.600	...
29	.241	.275	.586	.3870	44.6	49.7	37.1	43.20	— 2.53	.283	.328	.150	.242	96	91	67	84	E b N	W	NW bN	N 74 W	0.5	23.0	15.4	10.54	11.73	0.057	...
30	.617	.607	—	—	34.5	47.5	—	—	—	.166	.152	—	—	83	46	—	—	NWbW	S S W	Calm.	S 63 W	0.5	5.5	0.0	1.95	3.50	...	...
...	......	......	......	......	...	...	...	...	...	...	...	...	...	...	...	...	...	......	......	......	......	...	...	...	...	...	...	...
M	29.6181	29.6004	29.6294	29.6169	39.30	47.53	41.77	43.09	+ 2.10	.191	.208	.209	.203	77	62	78	72	....	....	....	N 84 W	15.15	12.65	6.18	......	8.39	3.972	2.0

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR APRIL, 1865.

NOTE.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer........................30.156 at 6 a.m. on 9th } Monthly range =
Lowest Barometer........................28.980 at 8 a.m. on 12th } 1.176 inches.
Self-registering Thermom. { Maximum Temperature .... 62°5 on 18th } Monthly range =
Minimum Temperature .... 23°0 on 9th } 39°5
Mean maximum Temperature .... 50°67 } Mean daily range=
Mean minimum Temperature .... 34°93 } 15°74
Greatest daily range ......30°0 from a.m. to p.m. of 18th.
Least daily range........... 6°8 from a.m. to p.m. of 20th.
Warmest day ....6th ... Mean temperature......... 51°95 } Difference = 20°37.
Coldest day ....8th ... Mean temperature .... 31°58 }
Maximum { Solar...103°0 on 13th } Monthly range =
Radiation. { Terrestrial .... 15°0 on 9th } 88°0
Aurora observed on 4 nights, viz:—15th, 16th, 17th and 18th.
Possible to see Aurora on 14 nights; impossible on 16 nights.
Snowing on 6 days; depth 2.0 inches; duration of fall, 6.6 hours.
Raining on 17 days, depth 3.972 inches; duration of fall 72.8 hours.
Mean of cloudiness = 0.64.
Most cloudy hour observed, 2 p.m.; mean = 0.81; least cloudy hour observed, p.m.; mean, = 0.46.

Sums of the components of the Atmospheric Current, expressed in miles.

North.	South.	East.	West.
1374.60	1213.45	1723.60	3236.53

Resultant direction N. 84° W.; Resultant velocity 2.11 miles per hour.
Mean velocity ....8.39 miles per hour.
Maximum velocity .... 44.3 miles, from 1.30 to 2.30 p.m. on 12th.
Most windy day ......12th...........Mean velocity, 19.40 miles per hour. } Difference=
Least windy day......15th...........Mean velocity, 0.41 ditto } 18.99 miles.
Most windy hour ......noon...............Mean velocity, 12.95 ditto } Difference=
Least windy hour ......5 a.m...............Mean velocity, 4.99 ditto. } 7.96 miles.

3rd. Solar halo.—5th. Thunderstorm at 1 p.m.—6th. Rainbow at 6 p.m.—12th. Very violent squalls of wind from west during the day.—19th. Solar halo during forenoon.—21st. Sheet lightning.—24th. Ice quarter of an inch thick.—26th. Solar halo in morning; sheet lightning during evening.—28th. Very stormy night.

The month of April, 1865, was comparatively warm and wet, while the velocity of the wind and cloudiness, although slightly in excess, closely approximated to the average.

COMPARATIVE TABLE FOR APRIL.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above aver'ge	Max. ob-served.	Min. ob-served.	Range.	No. of days.	Inches	No. of days.	Inches	Resultant. Direction.	Resultant. V'y.	Mean Force or Velocity.
1840	° 42.4	+ ° 1.4	° 65.9	° 25.3	° 40.6	14	3.420	2	...	...	...	....
1841	39.2	— 1.8	62.9	22.1	40.8	3	1.370	3	...	...	...	0.51 lbs.
1842	43.1	+ 2.1	89.5	21.6	67.9	8	3.740	2	...	...	...	0.57
1843	40.9	— 0.1	70.0	15.1	54.9	7	3.185	3	0.1	...	...	0.46
1844	47.5	+ 6.5	74.5	17.2	57.3	10	1.515	1	Inp.	...	...	0.24
1845	42.1	+ 1.1	66.0	14.8	51.2	11	3.290	4	1.5	...	...	1.00
1846	44.0	+ 3.0	79.4	24.4	55.0	10	1.300	2	1.3	...	...	0.55
1847	39.2	— 1.8	65.6	8.4	57.2	8	2.870	2	4.0	...	...	0.59
1848	41.3	+ 0.3	65.4	26.5	38.9	5	1.455	1	0.5	N 77° W	1.46	4.89mls.
1849	39.0	— 2.0	70.9	23 2	47.7	10	2.655	2	1.7	N 43° W	3.14	7.50
1850	37.9	— 3.1	63.2	18.2	45.0	7	4.720	2	1.1	N 39° W	1.12	7.64
1851	41.3	+ 0.3	59.2	25.8	33.4	11	2.295	3	1.2	N 14° E	2.52	8.07
1852	38.2	— 2.8	53.8	19.8	34.0	6	1.990	4	9.4	N 43° E	2.44	6.68
1853	41.9	+ 0.9	65.7	27.0	38.7	10	2.625	1	1.0	N 12° W	1.95	5.20
1854	41.0	0.0	65.1	22.3	42.8	12	2.685	4	2.7	N 50° E	2.57	6.81
1855	42.4	+ 1.4	63.8	12.2	51.6	8	2.030	3	1.6	N 36° W	3.99	7.57
1856	42.3	+ 1.3	69.8	15.1	54.7	13	2.780	3	0.1	N 29° E	1.64	6.06
1857	35.4	— 5.6	51.9	10.0	41.9	10	1.755	11	12.9	N 60° W	4.15	10.24
1858	41.5	+ 0.5	61.5	23.8	37.7	13	1.642	2	0.1	N 14° W	1.64	9.57
1859	39.5	— 1.5	62.1	23.9	38.2	9	2.527	8	1.2	N 36° W	2.33	10.79
1860	39.5	— 1.5	60.7	19.7	41.0	11	1.282	5	0.3	N 37° W	4.10	10.30
1861	42.0	+ 1.0	62.3	26.2	36.1	12	1.619	4	6.9	N 37° E	2.31	8.90
1862	39.6	— 1.4	64.1	20.1	44.0	10	2.235	4	0.2	N 50° E	2.48	9.77
1863	42.0	+ 1.0	67.7	8.9	58.8	8	2.210	4	1.6	N 14° E	3.75	9.20
1864	40.9	— 0.1	58.3	29.5	28.8	16	3.633	3	3.5	N 41° E	3.39	7.77
1865	43.1	+ 2.1	60.5	25.2	35.3	17	3.972	6	2.0	N 84° W	2.11	8.39
Results to 1864.	40.96	...	35.57	20.04	45.53	9.7	2.433	3.3	2.40	N 7° W	2.07	8.06
Exc. for 1865.	+ 2.14	...	— 5.07	+5.16	— 10.23	+ 7.3	+ 1.539	+ 2.7	— 0.40	....	.....	+ 0.33

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST,—MAY, 1865.

Latitude—43 deg. 39.4 min. North. Longitude—5 h. 17 m. 33 s. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resul't. Direction.	Velocity of Wind.					Rain in inches.	Snow in inches.
	6 A.M.	2 P.M.	10 P.M.	Mean.	6 A.M	2 P.M	10PM	ME'N		6 A.M	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A. M.	2 P. M.	10 P. M.		6 AM.	2 PM.	10 P.M.	Re-sul't.	ME'N		
					°	°	°	°	°												°							
1	29.525	29.535	29.606	29.5577	38.5	45.0	38.8	41.00	— 5.42	.182	.211	.186	.198	78	70	79	76	N N W	W N W	W S W	N 49 W	10.4	4.0	1.0	3.38	4.56	0.015	...
2	.641	.645	.720	.6745	37.4	50.4	40.7	43.42	— 3.30	.162	.188	.170	.181	72	50	66	63	Calm.	S S W	Calm.	S 50 E	0.0	5.0	0.0	1.18	2.52	...	...
3	.808	.770	.737	.7718	33.8	52.9	41.0	44.50	— 2 55	.152	.213	.192	.195	78	52	75	67	N N W	S S W	Calm.	S 47 W	1.2	9.0	0.0	1.61	3.74	...	...
4	.728	.640	.487	.6052	41.7	44.3	44.6	43.78	— 3.63	.210	.230	.245	.231	79	79	83	81	Calm.	E	N E b E	N 83 E	0.0	9.4	6.5	6.06	6.68	0.185	...
5	.363	.367	.442	.3972	45.4	57.3	52.2	51.97	+ 4.23	.243	.314	.337	.300	80	66	86	77	E N E	S E b E	N b W	N 7 E	2.6	1.0	8.0	2.70	3.79	...	...
6	.463	.390	.515	.4573	49.3	51.1	44.3	47.98	— 0.05	.314	.352	.221	.295	89	94	76	87	Calm.	N b E	W N W	N 39 W	0.0	7.8	16.0	6.96	8.46	0.700	...
7	.573	.467	—	—	43.2	54.4	—	—	—	.244	.308	—	—	87	72	—	—	W b S	S S W	S W b S	S 37 W	2.0	17.0	4.9	8.64	8.95	...	...
8	.243	.321	.373	.3153	49.3	58.7	48.6	53.13	+ 4.35	.288	.285	.312	.297	82	57	91	74	S W b W	N b E	Calm.	N 30 W	2.8	9.0	0.0	4.48	5.60	...	...
9	.463	.521	.611	.5365	45.7	56.2	44.6	48.35	— 0.82	.230	.264	.226	.235	75	58	77	69	N	S	Calm.	S 28 E	16.0	4.8	0 0	2.80	5.61	...	...
10	.597	.489	.537	.5337	43.5	54.4	41.0	45.82	— 3.68	.259	.308	.237	.264	92	73	92	85	E b N	E b N	N b W	N 15 W	10.5	0.5	18.4	6.18	8.16	0.355	...
11	.654	.657	.692	.6700	39.6	45.4	38.1	40.12	— 9.78	.184	.143	.102	.137	75	47	44	55	N W	N N W	N N W	N 30 W	12.8	9.0	8.5	8.76	8.91	...	..
12	.716	.614	.582	.6308	37.0	50.0	41.0	43.45	— 6.72	.141	.164	.184	.162	65	46	71	58	N N W	S E b S	S S W	S 1 W	2.5	9.2	6.2	4.69	5.32	...	...
13	.558	.678	.740	.6610	43.5	57.3	46.4	50.45	— 0.12	.240	.259	.212	.250	85	55	67	69	Calm.	S E b S	S E b E	N 7 W	0.0	6.2	1.0	2.31	4.84	...	...
14	.814	.855	—	—	43.2	50.8	—	—	—	.227	.262	—	—	81	70	—	—	Calm.	Calm.	Calm.	N 17 W	0.0	0.0	0.0	0.15	0.15	0.010	...
15	.990	.950	.876	.9305	51.1	60.1	52.2	54.90	+ 3.62	.278	.242	.264	.254	74	46	67	60	Calm.	E b N	Calm.	N 85 E	0.0	9.5	0.0	2.88	2.98	...	...
16	.809	.690	.601	.6910	49.7	68.4	58.3	60.05	+ 8.47	.278	.467	.333	.367	77	67	70	70	Calm.	S b W	Calm.	S 36 W	0.0	7.0	0.0	3.61	3.77	...	...
17	.543	.541	.605	.5622	62.7	62.7	47.9	59.25	+ 7.27	.477	.530	.321	.451	84	93	96	88	S W b W	N W b W	E b N	N 73 E	1.0	8.0	15.8	4.84	7.36	2.220	...
18	.706	.728	.679	.6972	48.2	49.7	52.9	50.35	— 1.93	.266	.216	.338	.270	79	60	84	73	E N E	E	E b N	N 77 E	6.5	8.0	16.0	10.69	10.78	0.280	...
19	.627	.645	.612	.6197	49.0	53.3	54.7	52.82	+ 0.20	.317	.377	.358	.355	91	92	84	89	E N E	E N E	E b N	N 68 E	11.4	9.0	4.0	6.43	6.44	0.125	...
20	.589	.509	.453	.5073	52.9	68.4	56.2	60.20	+ 7.18	.381	.533	.428	.457	95	77	95	88	E b N	E	E b N	N 83 E	1.5	5.2	0.7	3.14	3.37	...	...
21	.344	.179	—	—	49.0	67.0	—	—	—	.337	.499	—	—	97	76	—	—	E b N	E	N W	N 75 E	2.3	5.7	6.1	2.10	3.53	0.030	...
22	.246	.289	.420	.3202	58.3	59.8	45.4	55.68	+ 1.98	.333	.452	.225	.340	68	88	74	74	Calm.	W b N	N N W	N 44 W	0.0	11.8	10.0	6.99	7.53	0.105	...
23	.486	.493	.522	.4995	42.1	55.1	44.3	48.30	— 5.67	.178	.269	.230	.225	66	61	79	66	N N W	S S W	Calm.	N 66 W	14.0	8.0	0.0	3.58	5.33	...	...
24	.590	.447	.561	.5660	45.0	54.7	53.3	51.77	— 2.52	.221	.272	.312	.273	74	64	76	70	Calm.	Calm.	N N W	N 23 W	0.0	0.0	7.2	1.82	3.52	Inp.	...
25	.576	.594	.587	.5873	52.6	60.9	55.1	56.90	+ 2.22	.310	.298	.320	.308	78	56	73	67	N	S	N N W	N 3 E	11.2	3.2	8.5	4.00	5.89	...	...
26	.664	.595	.555	.5983	52.9	56.5	54.4	54.90	— 0.08	.184	.238	.186	.209	45	52	43	48	N	S S W	N	N 13 W	3.8	5.0	10.0	4.64	7.65	...	...
27	.549	.426	.390	.4525	52.2	67.0	58.7	58.75	+ 3.47	.226	.176	.191	.211	57	26	37	43	N	N b W	N	N 14 W	7.0	12.4	8.2	7.12	8.13	...	...
28	.402	.420	—	—	56.5	61.2	—	—	—	.356	.273	—	—	78	50	—	—	Calm.	S E b S	Calm.	S 60 E	0.0	6.0	0.0	2.17	2.99	...	...
29	.517	.548	.606	.5615	58.3	67.7	60.9	62.07	+ 6.12	.262	.348	.234	.291	54	50	43	51	N b W	S S W	N W b N	N 52 W	6.0	6.0	9.4	6.06	8.21	...	...
30	.697	.716	.711	.7085	58.3	69.5	59.8	63.62	+ 7.37	.235	.326	.392	.328	48	45	76	56	N W	S S W	S S W	S 79 W	3.0	9.0	0.5	1.48	2.70	...	...
31	.730	.677	.669	.6830	56.2	76.0	68.4	68.42	+11.87	.232	.532	.417	.411	51	59	60	57	Calm.	S S W	N W b N	N 39 W	0.0	2.5	2.5	0.98	2.32	...	...
M	29.5955	29.5769	29.5885	29.5850	47.93	57.51	49.77	52.29	+ 0.81	.251	.304	.266	.278	74	62	73	69	....	....	....	....	4.15	6.72	5.46	......	5.48	4.005	......

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR MAY, 1865.

Note.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely, at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer . . . . 30.003 at 8 a.m. on 15th. } Monthly range=
Lowest Barometer . . . . 29.179 at 2 p.m. on 21st. } 0.824 inches.

Self-registering Ther.
Maximum temperature . . . 79°.0 on 31st. } Monthly range=
Minimum temperature . . . 30°.0 on 12th. } 49°0
Mean maximum temperature . . 61°24 } Mean daily range=17°60
Mean minimum temperature . . 43°65 }
Greatest daily range . . . . 27°0 from a.m. to p.m. of 31st.
Least daily range . . . . 5°0 from a.m. to p.m. of 6th.

Warmest day . . . . 31st ...Mean Temperature . . . 68°42 } Difference=28°.30
Coldest day . . . . . 11th...Mean Temperature . . . 40°12 }

Maximum { Solar . . . . 124°0 on 31st } Monthly range=
Radiation { Terrestrial . . . . 18°4 on 12th } 105°.6

Aurora observed on 5 nights, viz.:—on 13th, 16th, 19th, 25th, and 26th.
Possible to see Aurora on 20 nights; impossible on 11 nights.
Raining on 11 days; depth 4.005 inches; duration of fall, 55.0 hours.
Mean of cloudiness=0.53; Most cloudy hour observed, 2 p.m; mean=0.66; least cloudy hour observed, 12 p.m.; mean=0.40.

Sums of the components of the Atmospheric Current, expressed in Miles.

North.	South.	East.	West.
1992.31	766.28	1146.55	1211.06

Resultant direction, N. 3° W.; Resultant Velocity, 1.65 miles per hour.
Mean velocity 5.48 miles per hour.
Maximum velocity 20.5 miles, from 7 to 8 p.m. on 6th.
Most windy day 18th—Mean velocity 10.78 miles per hour. } Difference 10.63.
Least windy day 14th—Mean velocity 0.15 miles per hour. }
Most windy hour, 1 p.m.—Mean velocity, 6.85 miles per hour. } Difference
Least windy hour, 3 a.m.—Mean velocity, 3.81 miles per hour. } 3.01 miles.

2nd, Thin ice. 3rd. Hoar frost. 5th. Lunar halo.
6th. Faint rainbow at sunset. 7th. Hoar frost.
8th. Solar halo. 9th. Solar halo.
11th. Solar halo. 12th. Thin ice.
17th. Heavy thunder storm; very stormy night.
20th. Rainbow; dense fog at night.
21st. Thunder storm; fine rainbow. 23rd. Thin ice.

May, 1865, may be characterized as a month whose differences from the average of the previous 25 years, are so slight as to be unnecessary quoting.

COMPARATIVE TABLE FOR MAY.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above Average	Maximum observed.	Minimum observed.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant. Direction.	Resultant. Velocity.	Mean Force or Velocity
1840	53.8°	+ 2.1	74.5°	30.8°	43.7°	9	4.150	0	...	...	...	...
1841	50.5	— 1.2	76.2	26.6	49.6	11	2.350	1	...	...	...	0.35 lbs
1842	49.1	— 2.6	74.3	30.0	44.3	7	1.275	0	...	...	...	0.53 "
1843	49.1	— 2.6	79.6	28.9	50.7	5	1.570	0	0.0	...	...	0.52 "
1844	53.6	+ 1.9	77.7	29.0	48.7	14	5.670	0	0.0	...	...	0.30 "
1845	49.6	— 2.1	76.6	29.4	47.2	8	2.300	0	0.0	...	...	0.55 "
1846	55.5	+ 3.8	78.1	34.3	43.8	9	4.375	0	0.0	...	...	0.46 "
1847	54.4	+ 2.7	72.5	27.8	44.7	12	2.040	0	0.0	...	...	0.29 "
1848	54.1	+ 2.4	78.5	31.9	46.6	13	2.520	0	0.0	N 40 W	1.31	4.93 ms
1849	48.0	— 3.7	72.5	32.7	39.8	16	5.115	0	0.0	N 51 E	1.97	5.33 "
1850	47.6	— 4.1	76.3	31.1	45.2	7	0.545	1	Inp.	N 64 W	2.05	6.32 "
1851	51.3	— 0.4	73.2	28.7	44.5	12	2.950	1	0.5	N 32 W	1.59	6.34 "
1852	51.4	— 0.3	73.3	34.5	38.8	7	1.125	1	Inp.	S 82 W	0.99	4.00 "
1853	50.9	— 0.8	78.4	38.4	40.0	17	4.420	1	Inp.	N 2 W	0.33	5.16 "
1854	52.2	+ 0.5	69.0	27.6	41.4	11	4.630	0	0.0	E	0.40	5.38 "
1855	53.1	+ 1.4	74.8	33.9	40.9	6	2.565	2	0.0	N 1 W	2.76	5.93 "
1856	50.5	— 1.2	80.1	35.5	44.6	14	4.580	1	Inp.	N 4 E	3.99	9.81 "
1857	48.9	— 2.8	72.5	27.9	44.6	15	4.145	1	Inp.	N 23 W	1.14	8.13 "
1858	48.9	— 2.8	66.0	35.0	31.0	17	6.367	0	0.9	N 42 E	3.33	9.30 "
1859	55.2	+ 3.5	76.2	41.5	34.7	11	3.410	0	0.0	N 72 E	1.59	5.70 "
1860	55.5	+ 3.8	73.2	35.6	37.6	16	1.815	0	0.0	N 26 E	2.66	7.17 "
1861	47.5	— 4.2	72.0	29.1	42.9	12	3.380	1	0.5	N 47 W	3.60	9.17 "
1862	52.2	+ 0.5	77.8	38.1	39.7	8	1.427	0	0.0	N 52 W	2.80	7.87 "
1863	54.3	+ 2.6	77.1	38.1	39.0	14	3.363	1	0.1	N 56 E	0.41	5.89 "
1864	54.8	+ 3.1	74.2	35.3	38.9	18	4.070	0	0.0	N 7 W	1.86	5.64 "
1865	52.3	+ 0.6	76.0	33.8	42.2	11	4.005	0	0.0	N 3 W	1.65	5.48 "
Results to 1864.	51.68	...	74.98	32.47	42.52	11.6	3.206	0.4	0.09	N 6 W	1.46	6.59
Exc. for 1865.	+0.62	...	+1.02	+1.33	—0.32	— 0.6	+ 0.799	— 0.4	— 0.09	...	...	—1.11

ASSOCIATION
FOR THE ADVANCEMENT
OF SCIENCE

THE
CANADIAN JOURNAL
OF
INDUSTRY, SCIENCE, AND ART:

CONDUCTED BY

THE EDITING COMMITTEE OF THE CANADIAN INSTITUTE.

NEW SERIES. No. LIX.

SMITHSONIAN INSTITUTION
MAY 28 1940
NATIONAL MUSEUM

SEPTEMBER, 1865.

TORONTO:
PRINTED FOR THE CANADIAN INSTITUTE,
BY LOVELL AND GIBSON, YONGE STREET.

CANADIAN INSTITUTE.

EDITING COMMITTEE.

GENERAL EDITOR - - Rev. WM. HINCKS, F.L.S.

I. *Geology and Mineralogy:* E. J. Chapman, Ph.D., Prof. of Geology and Mineralogy, Univ. Coll. Toronto.

II. *Physiology and Natural History:* Rev. Wm. Hincks, F.L.S., Prof. of Natural History, Univ. Coll., Toronto.

III. *Ethnology and Archæology:* Daniel Wilson, LL. D., Prof. of History and English Literature, Univ. Coll., Toronto.

IV. *Meteorology:* G. T. Kingston, M.A., Director of the Magnetic Observatory, Toronto.

V. *Chemistry:* Henry Croft, D. C. L., Prof. of Chemistry and Experimental Philosophy, Univ. Coll., Toronto.

VI. *Mathematics and Natural Philosophy:* J. B. Cherriman, M. A., Prof. of Natural Philosophy, Univ. Coll., Toronto; and the Rev. G. C. Irving, M.A., Prof. of Mathematics, Trin. Coll., Toronto.

VII. *Engineering and Architecture:* Sandford Fleming, C. E.

VIII. *Philology:* Rev. E. Hatch, B.A., Prof. of Classics, Morin Coll., Quebec.

The Canadian Journal is printed exclusively for gratuitous distribution among the Members of the Canadian Institute, and such Institutions and Societies as the Council may determine; but Members may purchase extra copies at 2s. 6d. per number, and Provincial Literary and Scientific Societies may obtain the Journal at the same rate, by an annual payment in advance.

⁂ *Communications for the Journal to be addressed to the General Editor,* Prof. Hincks, *Univ. Coll., Toronto. Communications on general business of the Institute, to be addressed to* U. Ogden, *Esq., M.D., Corresponding Secretary, or to Mr. Jas. Johnson, Assistant Secretary, Canadian Institute, Toronto.*

☞ Mr. Edward Allen, 12, Tavistock Row, Covent Garden, London, W, has been appointed the English Agent for the Institute. All European communications are requested to be forwarded through him.

THE CANADIAN JOURNAL.

NEW SERIES.

No. LIX.—SEPTEMBER, 1865.

NOTES ON LATIN INSCRIPTIONS FOUND IN BRITAIN.

PART XII.—THE GOVERNORS OF ROMAN BRITAIN.

BY THE REV. JOHN M^{c}CAUL, LL.D.,
PRESIDENT OF UNIVERSITY COLLEGE, TORONTO, ETC.

75. THE succession of the Imperial Legates is so important an element in fixing the chronology of the Roman period in British history, that an accurate discussion of the subject cannot fail to be useful; especially as, so far as I am aware, no correct list has yet been published. Such an examination, then, with reference not merely to historic, but also to epigraphic records, will form the subject of the present communication.

Before entering into particulars, it may be advantageous to take a general view of the government of Roman Britain.

For the first three centuries, from the time of Claudius to that of Constantine, the Governor of the island was *Legatus Augusti Pro Prætore*, and also *Consularis*. To him was confided the civil and military administration of the Province. The next in authority, under him, was the *Procurator*, the fiscal agent of the Emperor; and, in the absence of both, the government was administered, for the time, by the *Legati Legionum*. See Tacitus, *Hist.* i., 60.

In Constantine's division of the Empire, Britain became a *diœcesis* of the *Præfectura Galliarum*, and was governed by a *Vicarius*, under whom were *Præsides* of its provinces. In the time of the *Notitia*, probably *circa* A.D. 400, this *Vicarius*, or Governor-in-Chief, had under him two *Consulares, viz.*: of *Maxima Cæsariensis*, and of *Valentia*, and three *Præsides, viz.*: of *Britannia Prima*, *Britannia Secunda*, and of *Flavia Cæsariensis*. In addition to these were a *Comes litoris Saxonici per Britanniam*, *Comes Britanniæ*, or *Britanniarum*, and a *Dux Britanniarum*. The *Vicarius*, *Consulares*, and *Præsides*, exercised civil authority; whilst the *Comes litoris Saxonici*, the *Comes Britanniarum*, and the *Dux*, had military command.

I.—During the first Century.

The first eleven governors of Roman Britain are mentioned in order by Tacitus, in his *Agricola*. The following are their names as there given:—

Aulus Plautius,
Ostorius Scapula,
Didius Gallus,
Veranius,
Suetonius Paulinus,
Petronius Turpilianus,
Trebellius Maximus,
Vettius Bolanus,
Petilius Cerialis,
Julius Frontinus,
Cn. Julius Agricola.

This list is satisfactory, so far as informing us of the order of succession; but Tacitus, neither in his *Agricola*, nor elsewhere in his extant works, supplies materials sufficient for defining the beginning and the end of the government of each of those Legates. Let us consider, then, what certain information may be collected relative to these points.

The beginning of the administration of *Aulus Plautius** is certain, for we know from Dio, lx., 19, 21, that he was sent over by Claudius to the island, in the year when the Emperor was Consul, for the third time, with Vitellius for his colleague = A.D. 43. It would seem, too, as if there were no doubt as to the year in which his administration ended; for Dio, lx., 30, mentions the triumph of Plautius on his return to Rome, and from c. 29 we learn that the year was that in which Claudius was Consul for the fourth time, and Vitellius for the third = A.D. 47.

---

* *Aulus Plautius Silvanus.* I incline to the opinion of *Ed. Mon. Hist. Brit.*, and others, that he is the same as the person named in the inscription found at Tivoli, and given by Gruter, 453, 1., Orelli, n. 750, and *Mon. Hist. Brit.*, 1. Reimar, however, on Dio, lx., 30, expresses the belief that they were different. My opinion is founded on the words of the inscription: LEGAT·ET·COMITI·CLAVD·CAESARIS·IN·BRITANNIA. Now, although it is possible that there may have been two *Plautii* that were *comites* of Claudius

On the supposition that there was no, or but a short, interval between the end of one administration and the commencement of the next that succeeded, this same year may be regarded as the date of the beginning of the government of Ostorius Scapula. We are, at all events, certain, from Tacitus, *Ann.* xii., 25, that he had command in Britain in the consulship of Antistius and Suillius = A.D. 50.

There is, also,* no doubt as to the year in which *Petronius Turpilianus* succeeded *Suetonius Paulinus,* for we learn from Tacitus, *Ann.* xiv., 39, that it was the year after his consulship, *i.e.* A.D. 62. Now, from Tacitus, *Ann.* xiv., 29, 31, it is clear that Suetonius was in Britain in A.D. 59, 60, and 61.

The statements of Tacitus, *Hist.* ii., 65, that *Trebellius Maximus*

---

in Britain, it is scarcely credible that there were two of that name who were both *legati* and *comites* of that Emperor in the island, especially as Tacitus mentions but one. And yet there are objections to this identification. The *Plautius* named in the inscription was *Ti. Plautius M. F.—Silvanus Ælianus;* but this change of *prænomen,* from *Aulus* to *Tiberius,* may have been the consequence of adoption. A much more grave difficulty is found in the words of the inscription: HVNC IN EADEM PRAEFECTVRA VRBIS· IMP·CAESAR·AVG·VESPASIANVS ITERVM COS FECIT. Orelli's note on *iterum cos* is:—"*Consulem suffectum anni incerti. Primum fuerat cos. suffectus V. C.* 800 *p., Chr.* 47." Henzen agrees as to the first consulship, but gives A.D. 76 as the date of the second. But if we accept the identification, how can we reconcile this with the words of Tacitus: "Consularium *primus Aulus Plautius præpositus,*" and of Suetonius, *Vespas.* 4, "*Auli Plautii* Consularis?" If he had been Consul before A.D. 43, and was also Consul in A.D. 47, then his Consulship in A.D. 76 must have been his third, not his second. It seems as if we must either interpret *Consularis,* in both these passages, as meaning "possessed of consular dignity and authority, without having filled the office,"—a sense in which the word is frequently applied to Governors of Provinces—and regard this Plautius as different from the *Aulus Plautius* who had been *consul suffectus* in A.D. 29, or we must reject the identification with the *Plautius,* who was *consul suffectus* in A.D. 47. Of the two solutions, I prefer the first, but I am not satisfied.

* The words of Tacitus are: "*Suetonius * * * tradere exercitum Petronio Turpiliano,* qui jam consulatu abierat, *jubetur.*" From this I infer that Turpilianus crossed over to the island in the year after his consulship, which we know to have been in A.D. 61. Horsley, p. 37, takes the same view: "Here," he remarks, "we are also sure, because Tacitus says that Petronius Turpilianus had first finished his consulate; Turpilianus must, therefore, have entered upon the government in Britain in the year 62." And yet Orelli gives A.U.C. 814=A.D. 61, for the commencement of his government, and in this is followed by other editors of the Agricola. Mr. Merivale, *History of the Romans under the Empire,* vii., p. 79, also gives the date A.D. 61.

fled to Vitellius, when Emperor, and that he appointed [*] *e præsentibus Vettius Bolanus* in his place, furnish satisfactory evidence that both these events took place in A.D. 69.

The next date, of which we are certain, is the commencement of the government of *Agricola,* for it is plain, from Tacitus, *Agricola,* 9, that it was in the year after his consulship, *i.e.* A.D. 78; and we have, also, decisive testimony, in the same biography, that he was in the island in 79, 80, 81, 82, 83, and 84.

The positive evidence, then, which we have relative to the beginning and the end of the administration of the first eleven governors, may be stated thus:—

A.D. 43. Beginning of the government of Aulus Plautius.

A.D. 47. End of the government of Aulus Plautius; and succession of Ostorius Scapula.

A.D. 50. Ostorius Scapula victorious in Britain.

A.D. 62. End of the government of Suetonius Paulinus, and beginning of that of Petronius Turpilianus.

A.D. 69. End of the government of Trebellius Maximus, and beginning of that of Vettius Bolanus.

A.D. 78. End of the government of Julius Frontinus, and beginning of that of Cn. Julius Agricola, whose expeditions extend to A.D. 84.

Horsley, *Britannia Romana,* pp. 37, 38, 46, 47, 48, gives the certain dates as I have stated them, with the exception that he places the end of the government of Plautius, and the commencement of that of Ostorius Scapula, in A.D. 50; whilst the following are the results of his enquiry on the doubtful points:—

A.D. 53. Death of Ostorius Scapula, and succession of Didius Gallus.[†]

A.D. 57. Didius succeeded by Veranius.

A.D. 58. Death of Veranius; and succession of Suetonius Paulinus, in this or, more probably, the following year.

---

[*] Mr. Merivale, *Hist. of the Romans under the Empire,* vii., p. 80, remarks: "Trebellius had repaired to Rome, where Vitellius was clutching at the purple; but the tottering Emperor could give him no support. The soldiers rallied together for their own security, and the peace of the province did not suffer by the paralysis of the capital. On the restoration of authority at Rome, Vettius Bolanus was sent to take command, and their recent excesses seem to have been prudently overlooked." These statements are not correct. Trebellius fled to Vitellius in Gaul, and Vettius Bolanus was appointed, cerrainly not at Rome, but probably between Lugdunum and Augusta Taurinorum.

[†] His name is given by Horsley, whom Mr. Wright follows, as *Avitus Didius Gallus;* but the *prænomen* was really *Aulus.* In Tacitus, *Ann.* xiv., 29, the old reading was *Havitus* or *Avitus Didius;* but this reading was corrected by Lipsius, and his emendation, *A. Didius,* is now generally accepted.

A.D. 65. Petronius Turpilianus succeeded by Trebellius Maximus.
A.D. 71. Vettius Bolanus succeeded by Petilius Cerialis.
A.D. 75. Petilius Cerialis succeeded by Julius Frontinus.
*A.D. 85. End of the government of Agricola.

Orelli's views, as expressed in his notes on the *Agricola*, and adopted by several subsequent editors, differ, in some respects, from those stated by Horsley. He places Aulus Plautius in the years A.U.C. 796–800 = A.D. 43–47; Ostorius, A.U.C. 800–803 = A.D. 47–50; Didius Gallus, from the death of Ostorius to about A.U.C. 810 = A.D. 57; Suetonius Paulinus, A.U.C. 811–114 = A.D. 58–61; Petronius Turpilianus and Trebellius Maximus, A.U.C. 814–822 = A.D. 61–69; Vettius Bolanus, Petilius Cerealis, and Julius Frontinus, A.U.C. 822–831 = A.D. 69–78.

The chief points of difference are as to the dates of the following:

(*a*) The end of the government of Plautius, and the beginning of that of Ostorius Scapula.

(*b*) The death of Ostorius Scapula, and the succession of Didius Gallus.

(*c*) The end of the government of Suetonius Paulinus, and the beginning of that of Petronius Turpilianus.

Horsley was of opinion that Plautius remained as Legate in Britain from A.D. 43 to A.D. 50, in which year he was succeeded by Ostorius; and this opinion he evidently based on the belief that that year—*scil.* 50—was the first of the administration of Ostorius.

Let us examine the grounds of that belief. In the 12th Book of the Annals, c. 25, Tacitus begins the account of the events in the consulship of Antistius and Suillius = A.D. 50. In c. 31 he takes up the affairs of Britain, and remarks: "*At in Britannia* P. Ostorium pro prætore *turbidæ res excipere, effusis in agrum sociorum hostibus eo violentius quod* novum ducem exercitu ignoto *et coepta hieme iturum obviam non rebantur.*" He then proceeds with the narrative of the actions of Ostorius, including the spectacle of Caractacus at Rome before Claudius and Agrippina, and extends his notice of British affairs beyond the death of Ostorius to the administration of his successor, Didius Gallus, concluding his narrative, in c. 40, with the words:—*Hæc quamquam a duobus* [*Ostorio Didioque*] *propræ-*

---

* I concur in the view that it is more probable that Agricola remained in the island until 85, than that he left in 84.

toribus plures per annos gesta *conjunxi, ne divisa haud proinde ad memoriam sui valerent. Ad temporum ordinem redeo.*

It appears, then, that Tacitus, in chapters 31–40, instead of confining himself to the events of that year, on which he had entered in c. 25, *scil.* A.D. 50, includes those of several—*plures per annos gesta*—and under two governors of Britain. Horsley, believing that the years included by Tacitus were after, not before, that on which he had entered, assumes that Ostorius was *novus dux* in the consulship of Antistius and Suillius. But the authority of Dio, cited p. 305, cannot be neglected; and, if we accept it, we must necessarily place the commencement of the government of Ostorius in the same year of the ovation of Plautius, *i.e.* 47, unless, indeed, we assume that there was a considerable interval between the end of the administration of Plautius and the beginning of that of Ostorius. The notice, then, of British affairs by Tacitus in xii., 31–40, must be regarded as including years both before and after that in which Antistius and Suillius were consuls, *i.e.* both before and after that memorable scene of this year, in which Caractacus appeared before Claudius and Agrippina. There is, certainly, a difficulty in assigning this date to this scene, arising from the use of the term *nono,* in the words *nono post anno quam bellum in Britannia coeptum;* but the true explanation of this seems to be that suggested by Clinton, *Fasti Romani,* p. 34, that *Tacitus supposes the war to have commenced in A.D. 42, one year before the expedition of Plautius.

The death of Ostorius and the succession of Didius Gallus, are placed by Horsley at A.D. 53, whilst Orelli seems to give A.D. 50. Of the two opinions I prefer Horsley's, although, perhaps, the truth lies between the two. If Caractacus was in Rome in A.D. 50, it appears probable that at least another year must be allowed for the reverses of Ostorius, mentioned in c. 38.

In the other discrepancy, *viz.*: as to the end of the government of Suetonius Paulinus, and the beginning of that of Petronius Turpilianus, I believe Horsley's to be the correct view. See note, p. 305.

---

* There is a similar difficulty in the use of *octavus*, in *Agricola,* c. 33. Mr. Merivale, vii., p. 88, note, suggests the solution, that, "though it was Agricola's seventh, it might be called the eighth campaign of his army; for, in the year preceding his arrival, Julius Frontinus had led an expedition against the Silures.—*Agric.*, 17." Orelli is of opinion, that Agricola counts from the year in which the province was assigned to him, *scil.* A.D. 77, immediately after his consulship, which he held from July 1st to September 1st. Either of these explanations seems preferable to the supposition of a mistake of viii. for vii. See Horsley, *Brit. Rom.*, p. 48.

It appears, then, that the administration of the first eleven governors of Britain extended over 42 years, *scil.* from the third year of Claudius, A.D. 43, to the fifth year of Domitian, A.D. 85.

In addition to these, the twelfth is noticed by Tacitus as the "*successor*" of Agricola, without mention of his name. From Suetonius, *Domitian*, 10, it may be inferred, with some reason, that it was *Sallustius Lucullus,* who was put to death by order of that Emperor. There is no evidence, however, as to either the beginning or the ending of his government.

The next legate, of whom any record is extant, is *C. Salvius Liberalis,* the Orator. We derive the knowledge of his having been governor of Britain from the following inscription, found at *Urbisaglia,* and given by Orelli, n. 1170 :—

[C · SALVI]O · C · T · VEL · LIBERALI
[NONIO] BASSO · COS · PROCOS · PROVIN
[CIAE MA]CEDONIAE · LEGATO · AVGVSTORVM
[PROVINC ·] BRITANN · LEGATO · LEG · V · MACED
[FRATRI ·] ARVALI · ALLECTO · AB · DIVO · VESPASIANO
[ET · DIVO · TI]TO · INTER · TRIBVNICIOS · AB · ISDEM
[ALLECTO ·] INTER · PRAETORIOS · QVINQ · IIII · P · C · HIC · [SORTE
[PROCOS · FAC]TVS · PROVINCIAE · ASIAE · SE · EXCVSAVIT.

Caio Salvio Caii filio Velina (tribu) *Liberali Nonio Basso Consuli Proconsuli provinciæ Macedoniæ Legato Augustorum provinciæ Britanniæ Legato legionis quintæ Macedonicæ Fratri Arvali allecto ab Divo Vespasiano et Divo Tito inter Tribunicios ab iisdem allecto inter Prætorios Quinquennali quartum Patrono Coloniæ. Hic sorte proconsul factus provinciæ Asiæ se excusavit.*

By the expression *Legato Augustorum* here I understand that Caius Salvius was Legate of one Emperor, and, on his death, continued as such under the succeeding Emperor. Now, these may have been either Domitian and Nerva, Nerva and Trajan, or Trajan and Hadrian. It seems most probable that he was the Legate of Nerva and Trajan, *i.e.* that his government extended over A.D. 98, †99.

---

* This designation is commonly used, as is well known, to signify the Legate of conjoint Emperors; but it seems impossible that this can be its meaning in this inscription, for the first example of two Augusti was in A.D. 161 when Aurelius took Verus as his colleague in the imperial dignity. Nor is there any evidence, so far as I am aware, that Trajan was called Augustus during the life of Nerva.

† In A.D. 100, Liberalis defended Marcius Priscus, when he was accused by Pliny and Tacitus.

II.—During the second Century.

The military diploma found at Malpas, in Cheshire, in 1812, and given in *Mon. Hist. Brit.*, n. 7, *Brit. Rom. Inscrip.*, p. 5, mentions Trajan's legate, in A.D. 104, *scil.* *[*] *L. Neratius Marcellus;* but we have no evidence as to the time of his arrival or departure.

From another military diploma, found at Stannington, Yorkshire, in 1761, and given in *Mon. Hist. Brit.*, n. 9, we learn that [†]*Platorius Nepos* was Hadrian's legate in A.D. 124.

We also know the names of two other legates of this Emperor, *scil. Julius Severus,* from Xiphiline, lxix., 13, and *Pompeius Falco,* from Henzen's Inscrip., n. 5451. Julius Severus was in Britain in A.D. 134, for we may assume, with Clinton, *Fasti Romani,* p. 120, that it was in this year Hadrian sent him to the Jewish war.

Camden, *Introd.*, p. xcvi., *Gough's ed.*, discovered in an [‡]inscription another legate under this Emperor, *viz.: Priscus Licinius;* and Horsley believed that he found [||]traces of his names in the order *Licinius Priscus,* on a stone found in Cumberland. See *Brit. Rom.*, p. 270. There is no doubt that the celebrated general, *Statius Priscus,* was Governor of Britain; but there is evidence that he was Legate under [§]Aurelius and Verus, not under Hadrian.

We find no mention of any legate, after Severus and Falco, until we come to *Lollius Urbicus,* the governor under Antoninus Pius, mentioned by Capitolinus, in his life of that Emperor. He gained his victory over the Britons most probably in A.D. 139.

He is noticed in the fragment of an inscription found at Bemulie,

---

[*] See *Brit. Rom. Inscrip.*, p. 8.

[†] All the British inscriptions have *Platorius,* not *Plætorius.*

[‡] This inscription is said, in Speed, *Hist., ed.* 1623, p. 219, to have been found in Britain, at the Picts' Wall; but there seems no reason to doubt that it was found at Rome, as stated in Gruter.

[||] I can offer no feasible conjecture as to the name of the legate in this inscription. The remaining letters are thus given by Horsley:—

IICNC IR
V PR PR

At the beginning we have CAESTRA, from which it may be inferred that the Emperor was Hadrian.

[§] See Henzen, n. 5480, who gives the inscription in an amended form. From his note it appears that Borghesi identified this governor with the *Priscus,* who was, against his will, proclaimed Emperor by the army in Britain. Thus, also, Mr. Merivale, vii., p. 568, who cites the passage from Constantine Porphyrogenitus.

Scotland, and given by Stuart, *Caledonia Romana*, pl. x., fig. 3, *Brit. Rom. Inscrip.*, p. 262:—

. . . .
P · LEG · IIA
Q · LOLLIO VR
LEG AVG · PR · PR

. . . . . . Patri *Patriæ Legio Secunda Augusta—Quinto Lollio Urbico Legato Augusti Pro Prætore*

Capitolinus, in his life of Marcus Aurelius, mentions *Calpurnius Agricola*, as a legate in Britain. From the language used by Capitolinus, it may, I think, be inferred, with some probability, that this governor was sent to the island in A.D. 162.

Mr. Wright, *The Celt, the Roman, and the Saxon*, p. 100, 2nd ed., states, with regard to this Emperor:—

> "The Roman Province was invaded on the accession of Marcus Aurelius, in 161; but the invaders were checked by a new proprætor, Aufidius Victorinus."

He, accordingly, places him in his list of Roman Governors, p. 488. There is, however, no authority for this statement. Aufidius Victorinus was legate in Germany, not in Britain; and Capitolinus distinctly states, that "Calpurnius Agricola was sent against the Britons, Aufidius Victorinus against the Chatti."

Calpurnius Agricola is named on an altar, found at Caervoran (*Magna*), Northumberlandshire, and given by Horsley, *Brit. Rom.*, n. liii.:—

DEAE SVRI
AE SVB CALP
VRNIO AGR
ICOLA LEG · AVG
PR · PR · A · LICINIUS
CLEMENS PRAEF
III · A · IOR

Deæ Syriæ sub Calpurnio Agricola Legato Augusti Pro Prætore Aulus Licinius Clemens Præfectus Cohortis primæ Hamiorum.

See *Brit. Rom. Inscrip.*, p. 258; *Notes on Lat. Inscrip.*, p. xi.; and *Archæolog. Æliana*, N.S. i., p. 250, n. 101.

Xiphiline, lxxii., mentions *Ulpius Marcellus* as legate of Commodus.

This governor is named, if Mr. Clayton's reading be correct, in the following inscription, on an altar* found at Benwell (*Condercum*), Northumberlandshire, and given in the *Gentleman's Magazine*, December, 1862:—

DEO ANOCITICO
IVDICIIS OPTIMO
RVM MAXIMORVM
QVE IMPP · N · SVB VLP
MARCELLO COS · TINE
IVS LONGVS IN PRAE
FECTVRA EQVITV
LATO CLAVO EXORN.
TVS ET Q · D

Deo Anocitico judiciis Optimorum Maximorumque Imperatorum Nostrorum sub Ulpio Marcello Consulari Tineius Longus in præfectura equitum lato clavo exornatus et Quæstor [?] *designatus* [?].

In *Brit. Rom. Inscrip.*, p. 288, where I have discussed this inscription, I offered the conjecture that the letters at the end of the fourth line, read VIB or VLP, were NER, and that the legate named was *Neratius Marcellus*, Governor in A.D. 104. From further information on the subject, I have reason to believe that Mr. Clayton's reading is correct, *scil.* VLP. Accordingly the *Imperatores Nostri* must be—as suggested by Rev. Dr. Scott (see *Gent. Magazine, November*, 1863)—Aurelius and Commodus, and the date A.D. 177–180. Hence we assume, with probability, that *Ulpius Marcellus* was legate 179 to 184; for it was in this latter year that his achievements in the island won for Commodus the title *Britannicus*. See Clinton, *Fasti Rom.*, p. 182.

Perennis is regarded by some as the successor of Ulpius Marcellus, but the evidence does not seem sufficient to prove that he was ever in the island.

---

* There was found, at the same time and in the same place, another altar, bearing the inscription:—

DEO
ANTENOCITICO
ET NVMINIB·
AVGVSTOR·
AEL·VIBIVS
Ↄ LEG·XX·V·V
V·S·L·M

Nothing is known of the god *Antenociticus* or *Anociticus*. It has occurred to me that their names indicate a Greek origin, as if they had been a pair, whence we have, in the designation of one of them, ANT, *i.e.* ἀντί.

From Capitolinus, in his lives of *Pertinax* and *Albinus*, we learn that they also were legates under Commodus, and that *Junius Severus* was sent as successor to Albinus. It is not probable, however, that he succeeded to him, for from Xiphiline, lxxiii., we find that Albinus held the command in Britain in the time of the Emperor Didius Julian, and, after his death, being appointed Cæsar by Severus, he administered the government of the island until A.D. 196, when he passed over to Gaul, where he was defeated and put to death in the following year.

The position of affairs at this time is thus described by Lingard, *Hist. of England*, i., p. 39 :—

> "Severus was now undisputed master of the empire. To abolish the exorbitant power of the prefect of Britain, he divided the island into two governments, bestowing the one on Heraclianus, and the other on Virius Lupus."

There is no authority for these two simultaneous governors of Britain, although Lingard refers, in his note, to "Herod., iii., 24, Spartian in Sever., p. 320, Inscriptions in Speed, p. 139." There is evidence in Herodian, that Severus divided the island into two governments. Spartian also states that he sent *Heraclitum ad obtinendas Britannias;* but here we should read *Bithynias*, as Salmasius has suggested. And no inscriptions notice any other governor of the time except Virius Lupus, mentioned by Ulpian, *Digest*, xxvii., 6, 2, and named in the following inscriptions, found in Yorkshire, and given by Horsley, *Brit. Rom.*, pp. 192, n. 62, 311 :—

(1)

DAE FORTVNAE
VIRIVS LVPVS
LEG · AVG PR · PR ·
BALINEVM VI
IGNIS EXVST
VM · COH · I · THR
ACVM REST
ITVIT · CVRAN
TE · VAL · FRON
TONE PRAEF
EQ · ALAE VETTO ·

Deæ Fortunæ Virius Lupus Legatus Augusti Pro Prætore balineum vi ignis exustum Cohors prima Thracum restituit curante Valerio Frontone Præfecto Equitum Alæ Vettonum.

(2)

IM · SEVERVS
AVG · ET ANTONINVS
CAES · DESTINATVS
RESTITVERVNT · CV
RANTE VIRIO LVPO
LEG · EORVM PR · PR ·

Imperator Severus Augustus et Antoninus Cæsar Destinatus restituerunt curante Virio Lupo Legato eorum Pro Prætore.

It is not easy to determine satisfactorily the dates of these inscriptions; indeed, the correctness of the readings seems doubtful. The date suggested for the second, by Henzen, is "A.D. 195," with a query, and by the Ed. *Mon. Hist. Brit.*, "Cir. A.D. 197;" but neither of these is satisfactory. We know from Spartian, *Sever.*, c. 10, that Caracalla was appointed Cæsar, with the name *Antoninus*, whilst Severus was on his way to attack Albinus; and this appointment is proved by coins and laws to have taken place in A.D. 196, not at the beginning of it, for Severus was in Mesopotamia at the commencement of the year, from which he returned to Rome, previously to setting out against Albinus; and, besides, the earliest law which we have of Severus and Antoninus, of this year, is dated June 30. Severus had already set out, as we learn from Herodian, iii., c. 20, before Albinus crossed over to Gaul. It was, as I think, at this time, about April or May, 196, whilst Caracalla was yet *Antoninus** *Cæsar destinatus*, that Virius Lupus was sent to occupy the island vacated by Albinus; and, accordingly, we may infer that shortly after his arrival he directed the work commemorated by this inscription. If LEG · AVG ·, in the first inscription, be correct, the date must be either 196 or 197, for Caracalla was *Augustus* in 198; but I suspect that the true reading is AVGG.

III.—During the third Century.

It is not known how long Virius Lupus held the government; *Lucius Alfenus Senecio*, mentioned in several inscriptions found in Britain, and in one found at Naples, Orelli, n. 4405, was, probably, his immediate successor. The following inscription, found at Risingham, Northumberland, and printed, *Archæol. Æliana*, N. S. i., p. 230, *Mon. Hist. Brit.*, n. 192 a., is of the date A.D. 205–207:—

---

* And yet see a fragment of the *Pontifical Fasti*, Gruter, p. ccc.; Clinton, *Fasti Romani*, p. 200; Eckhel, vii., p. 199.

.................ICO MAXI
COS III ET MAVREL ANTONINO PIO
COS II AVG........................
PORTAM · CVM · MVRIS VETVSTATE DI
LAPSIS IVSSV ALFEN SENECINIS VO
COS CVRANTE OCLATINI ADVENTO PRO
AVGG NN C. I VANGON OPFS
CVM AEMI SALVIAN TRIB
SVO ASOLO RESTI

i.e. [Imperatoribus Cæsaribus Lucio Septimio Severo Pio Pertinaci Augusto Arabico Adiabenico Parth]*ico Maximo Consuli tertium et Marco Aurelio Antonino Pio Consuli secundum Augusto* [et Publio Septimio Getæ nobilissimo Cæsari Consuli] *portam cum muris vetustate dilapsis jussu Alfeni Senecionis Viri Clarissimi Consularis curante Oclatinio Advento procuratore Augustorum Nostrorum cohors prima Vangionum operibus factis cum Æmilio Salviano Tribuno suo a solo restituit.* See *Brit. Rom. Inscrip.*, § 69, where I have discussed the inscription.

In the list of *Legati*, given in the *Mon. Hist. Brit.*, p. cxxv., we find *Papianus* mentioned as having filled that office in "An. 211." The authority referred to for this statement is a passage in the 12th chapter of the XIIth Book of Zonaras, cited and translated in p. lxxxvii., of the same work. The following are the original and the translation, as there given :—

Ἀντωνῖνος δὲ . . . τοῖς μὲν πολεμίοις τῶν Βρεττανῶν αὐτίκα ἐσπείσατο, τῆς τε χώρας αὐτοῖς καὶ τῶν φρουρίων ἐκστὰς, τὸν δε ἔπαρχον τὸν Παπιανὸν μετεστήσε τῆς ἀρχῆς.

"Antoninus, moreover, . . . immediately entered into a treaty with such of the Britons as had been his enemies; retiring from their country and fortresses, and appointing Papianus præfect for that government."

The words, mis-translated "appointing Papianus præfect for that government," plainly mean that "he removed the præfect Papianns from his office." This Papianus, otherwise Papinian, the celebrated jurist, was with Severus in Britain as *Præfectus Prætorio.* See Xiphiline, lxxvi.

From the following inscription, found near Welton Hall, Northumberland, and printed, *Mon. Hist. Brit.*, n. 17 a., we learn the name of Caracalla's legate in A.D. 213 :—

* * *	AES MAR
* * *	NTONINO
* * *	CI AVG ARAB
ADIAB · P	RT MAXIM
O BRI.	MAXIMO
TRIB PP	XVI COS IIII
MARTIO	IVL MARCO
LEGA ·	G PP

i.e. Imperatori Cæsari Marco Aurelio Antonio Pio Felici Augusto Arabico Adiabenico Parthico Maximo Britannico Maximo Tribuniciæ Potestalis XVI *Consuli quartum Martio Julio Legato Augusti Proprætore.*

Claudius Paulinus, another legate of the same Emperor, is named in two inscriptions found at High Rochester (*Bremenium*), Northumberland :—

(1) IMP CAE...............
..........P · F..........
..........CH · I · F · VARD
....BALLIS · A SOLO R....
SVB · C · CL · APELLINI · LEG · AVG
INSTANTE · AVR · QVINTO · TR ·

Dr. Bruce, *Roman Wall,* p. 459, 2nd ed., reads it thus :—*Imperatori Cæsari Pio Felici Cohors prima Fida Vardulorum ballis? a solo restituit sub Caio Claudio Apellinio Legati Augustali instante Aurelio Quinto Tribuno.*

(2) IMP · CAES · M · AV....
.........PIO · F ·....
TRIB · POT .. COS....
P · P · BALLIST · A SO..
VARDVL..........
TIB · CL · PAVL........
PR · PR · FEC........
P · AEL...........

i.e. Imperatori Marco Aurelio — Antonino — Pio Felici Tribuniciæ Potestalis — Consuli — Patri Patriæ Ballistarium a solo Cohors prima Fida *Vardulorum — Tiberi — Claudi — Paulin* — Legat — August — *Pro Prætore fecit* instante *Publio Ælio* — —

It is plain that we have in these inscriptions the same legate, *Claudius Paulinus,* who is also named in an inscription found at

Vieux, Normandy. See Smith, *Collect. Antiq.*, iii., p. 98. Line 5 of the first inscription should accordingly be read, an I have suggested, *Brit. Rom. Inscrip.*, p. 162, *Sub cura Claudii Paulini*, &c.

It seems also plain that the second inscription is the older of the two, for in it the making, the erection of the building, is commemorated, of which the restoration is noticed in the first. It is not plain, however, what Emperor is named—whether Caracalla or Elagabalus. Dr. Bruce gives the latter as certain; I rather incline to the former. See *Brit. Rom. Inscrip.*, p. 163.

From an inscription, found at Netherby (*Castra Exploratorum*), Cumberland, and printed *Mon. Hist. Brit.*, n. 40, we learn the name of the legate of Elagabalus in his second year, *scil.* A.D. 219 :—

IM. . . . . .ANTON
. . P · F AVG BIS COS VEXIL
LEG · $\overline{\text{II}}$ · AVG · ET XX V · V ·
ITEM COH · $\overline{\text{I}}$ · AEL · HISP
M · EQ · SVB CVRA M
D IVNII LEG · AVG · PR · PR . .

i.e. Imperatori Cæsari Marco Aurelio *Antonino Pio Felici Augusto bis Consuli Vexillationes Legionis secundæ Augustæ et vigesimæ Valeriæ Victricis item cohors prima Ælia Hispanorum Miliaria equitata sub cura* (M) *Decimi Junii Legati Augusti Pro Prætore.*

In *Mon. Hist. Brit.* there is a note, in which there is a query whether the Emperor named is Elagabalus, and consequently whether the date is 219. If the reading be correct, the Emperor who is named is certainly Elagabalus; for if it had been Caracalla, who was *bis cos,* his father would have been mentioned. I am not satisfied as to the name of the legate. The M is separated in the *copy, by an interval from CVRA, so that we may not read CVRAM, and this is, besides, unusual. Nor is it probable that it stands for *Marci.* It has occurred to me that, perhaps, there was an O after it, and that IVNII was a misreading for IVLII. We shall thus get MOD · IVLII, *i.e.* †*Modii Julii,* the same legate named on a stone, without date, found at Birdoswald.

An inscription found at Chesters *(Cilurnum)*, Northumberland, and printed, *Mon. Hist. Brit.*, n. 66, informs us that *Marius Valerianus* was a legate of the same Emperor in A.D. 221.

---

* I have seen this inscription only in the *Mon. Hist. Brit.* It is printed, also, by Hodgson, and Lysons, but I am not able to consult either of these authorities.

† In *Brit. Rom. Inscrip.*, p. 30, I have offered a different conjecture.

IMP · CAES . . . . . AVREL . . . .
AVG. . . . .
. . . . BP. . COS. . DIV
DIVISEVER NEP. . . . .
CAESAR · IMPER. . . . .
ALAE · II · ASTVRV. . .VETVSTAT. . . ·
ERVNT · PER · MARIVM VALER. A
INSTANTE · SEPTIMO · NILO PRAE
DEDICATVM · III · KAL · NOVEM · GRATO ETSELE

Dr. Bruce, *Roman Wall*, p. 155, 2nd ed., reads it thus :—*Imperatori Cæsari* Marco *Aurelio* — Augusto — Pontifici Maximo *Tribunitia potestate Consuli* iv *Divi* Antonini filio *Divi Severi nepoti Cæsari Imperatori* — Duplares *Alæ II Asturum* templum *vetustate* conlapsum *restituerunt per Marium Valerianun* Legatum Augustalem Propraetorem *instante Septimio Nilo præfecto Dedicatum III Kalendas Novembris Grato et Seleuco* consulibus.

From another inscription, found at Netherby *(Castra Exploratorum)*, Cumberland, and printed, *Mon. Hist. Brit.*, n. 40, we learn that he remained governor under Alexander Severus, in A.D. 222.

IMP CAES M AVRELIO
SEVERO ALEXANDRO PIO FEL AVG
PONT MAXIMO TRIB POT COS PP COH I AEL
HISPANORVM M EQ DEVOTA NVMINI
MAIESTATIQUE EIVS BASELICAM
EQVESTREM EXERCITATORIAM
IAMPRIDEM A SOLO COEPTAM
AEDIFICAVIT CONSVMMAVITQVE
SVB CVRA MARI VALERIANI LEG
AVG PR PR INSTANTE M AVRELIO
SALVIO TRIB COH · IMP · D · N ·
SEVERO ALEXANDRO PIO FEL
AVG COS

Imperatori Cæsari Marco Aurelio Severo Alexandro Pio Felici Augusto Pontifici Maximo Tribunitiæ Potestatis Consuli Patri Patriæ Cohors prima Ælia Hispanorum Miliaria Equitata devota numini majestatique ejus basilicam equestrem exercitatoriam jampridem a solo coeptam ædificavit consummavitque sub cura Marii Valeriani Legati Augusti Pro Prætore instante Marco Aurelio Salvio Tribuno Cohortis Imperatore Domino Nostro Severo Alexandro Pio Felice Augusto Consule.

In *Mon. Hist. Brit.* there is a note on the final COS, assigning the date A.D. 222–225. But, if the reading of the third line be correct, it was not only his first consulship, but also the first year of his tribunician power. Hence it appears that the date is A.D. 222.

In A.D. 225, the Emperor Alexander Severus had a different legate, whose *cognomen* was *Maximus*, as appears from the following, found at Great Chesters *(Æsica)*, Northumberland, and printed *Arch. Æliana*, N. S., i., p. 226, *Brit. Rom. Inscrip.*, p. 155:—

IMP · CAES MAVR SEVE
RVS ALEXANDER P FE
AVG HORREVM VETV
STATE CONLABSVM M
COH II ASTVRVM S · A
A SOLO RESTITVERVNT
PROVINCIA REG........
MAXIMO LEG..........
KAL MARTI
FVS

Imperator Cæsar Marcus Aurelius Severus Alexander Pius Felix Augustus horreum vetustate conlapsum milites Cohortis secundæ Asturum Severianæ Alexandrianæ a solo restituerunt provincia[m] *regente* —— *Maximo Legato* Augusti Pro Prætore — *Kalendis Martiis* —— *Fusco* II · et Dextro Consulibus. See *Brit. Rom. Inscrip.*, p. 156.

In an inscription, found at Carrawburgh *(Procolitia)*, Northumberland, and figured, Bruce's *Roman Wall*, 2nd ed., p. 165, we have fragments of the name of the legate of Maximinus, in A.D. 237:—

........................M
......................MAX
.....................RCOS
....................ARM^{S}
..........CAES N · SVB · S
.........CCIANO VC LEG
......COH I BATAVORVM
......ANTE BVRRIO.....
........TO PRAE........
........RNELIANO......

The following are Dr. Bruce's comments:—

"The words COH I BATAVORVM are quite distinct. The line following may probably be read [INST]ANT[E] BVRRIO, and bears the name of the prefect under whose superintendence the building was erected, to which the slab referred. In the last line, the word [CO]RNELIANO may be perceived. In 237, when Maximinus was Emperor, Titius Perpetuus and Rusticus Cornelianus were consuls. That this is the date of the inscription is rendered likely from a fragment of the Emperor's name appearing in the beginning of it."

This determination of the date is well and satisfactorily done; but MAX in the second line probably stands for *Maximus,* following Dacicus, Germanicus, or some such title, the M in the first line being the second in Maximinus. RCOS, in the third, may be part of PROCOS. ARMS, in the fourth, is a portion of *Sarmaticus,* a title of his son *Maximus,* the Cæsar. The name of the legate may have been *Salvius Coccianus,* the same as that borne by Otho's nephew mentioned in Tacitus, *Hist.*, ii., 48.

Nonnius Philippus was the Emperor Gordian's legate in A.D. 242, as appears from the following inscription, found at Old Penrith, Cumberland, and printed, Horsley's *Brit. Rom. Cumberland,* n 55:—

I O M
PRO SALVTE IMPERATORIS
M ANTONI GORDIANI P · F ·
INVICTI AVG ET SABINIAE FVR
IAE TRANQVILE CONIVGIEIVS TO
TAQVE DOMV DIVIN · EORVMA
LA AVG GORDIA OB VIRTVTEM
APPELLATA POSVIT CVI PRAEEST
AEMILIVS CRISPINVS PRAEF
EQQ NATVS IN PRO AFRICA DE
TVSDRO SVB CVR NONII PHI
LIPPI LEG · AVG · PRO PRETO
ATTICO ET PRAETEXTATO
COSS

Jovi Optimo Maximo pro salute Imperatoris Marci Antonii Gordiani Pii Felicis invicti Augusti et Sabiniæ Furiæ Tranquillæ conjugi[s] *ejus totaque domu divina eorum ala Augusta Gordiana ob virtutem appellata posuit cui præest Æmilius Crispinus præfectus Equitum natus in Provincia Africa de Tusdro sub cura Nonnii Philippi Legati Augusti Pro Prætore Attico et Prætextato Consulibus.*

Egnatius Lucilianus and *Mæcilius Fuscus* were also legates of the same Emperor, but we do not know their dates. Perhaps, as Horsley thought, they preceded Nonnius Philippus. They are named in the following inscriptions, found at Lanchester, Durham, and printed, Horsley's *Brit. Rom. Durham*, xi. xii., *Brit. Rom. Inscrip.*, p. 56:—

IMP · CAES · M · ANT · GORDIA
NVS · P · F · AVG · BALNEVM · CVM
BASILICA A SOLO INSTRVXIT
PER EGN LVCILIANVM · LEG AVG
PR · PR · CVRANTE M · AVR
QVIRINO PRE · COH I L GOR

*Imperator Cæsar Marcus Antonius Gordianus Pius Felix Augustus balneum cum basilica a solo instruxit per Egnatium Lucilianum Legatum Augusti Pro Prætore curante Marco Aurelio Quirino Præfecto Cohortis primæ *Lingonum Gordianæ.*

IMP · CAESAR · M · ANTONIVS
GORDIANVS · P · F · AVG
PRINCIPIA ET ARMAMEN
TARIA CONLAPSA RESTITV
IT PER MAECILIVM FVSCVM · LEG
AVG · PR · PR · CVRANTE M · AVR
QVIRINO PR · COH · I · L · GOR

*Imperator Cæsar Marcus Antonius Gordianus Pius Felix Augustus principia et armamentaria conlapsa restituit per Mæcilium Fuscum Legatum Augusti Pro Prætore curante Marco Aurelio Quirino Præfecto Cohortis primæ *Lingonum Gordianæ.*

We have no account of any legate between the times of Gordian and Valerian and Gallienus. Under the reign of the latter, in A.D. 254–260, Desticius Juba was was Governor in the island, as we learn from the following inscription, found at Caerleon (*Isca Silurum*), Monmouthshire, and figured in Lee's *Isca Silurum*, pl. 5, fig. 1:—

IMPP · VALERIANVS ET GALLIENVS
AVGG · ET VALERIANVS NOBILISSIMVS
CAES · COHORTI VII · CENTVRIAS · A SO
LO RESTITVERVNT · PER · DESTICIVM IVBAM
VC · LEGATVM AVGG · PR · PR · ET
VITVLASIVM LAETINIANVM LEG · LEG
II · AVG · CURANTE · DOMIT · POTENTINO
PRAEF · LEG EIVSDEM

---

* See *Brit. Rom. Inscrip.*, p. 57.

Imperatores Valerianus et Gallienus Augusti et Valerianus Nobilissimus Cæsar cohorti septimæ centurias a solo restituerunt per Desticium Jubam Virum Clarissimun Legatum Augustorum Pro Prætore et Vitulasium Lætinianum Legatum Legionis secundæ Augustæ curante Domitio Potentino Præfecto Legionis ejusdem.

The date is between A.D. 254–260. See *Brit. Rom. Inscrip.*, p. 125, and *Notes on Latin Inscrip.*, part x.

Desticius Juba is the latest Governor named in dated inscriptions found in Britain. He is also mentioned in inscriptions found on the continent: see *Museum Veronense,* cccxxvii., 2, and Orelli, n. 4913. In the list, given in *Mon. Hist. Brit.*, p. lxxv., the next in chronological order is Victorinus, dated "277 ?" and Zosimus and Zonaras are referred to as authorities for the insertion of his name; but it cannot be inferred from the statements of either that Victorinus was ever Governor of the island.

Vopiscus informs us that Britain, in the reign of the Emperor Carus, *i.e.* A.D. 282–283, was under Carinus, as Cæsar.

From A.D. 287 to A.D. 293, Britain was ruled by Carausius, who, from A.D. 290, was recognized as Augustus; his murderer, Allectus, held the island until A.D. 296, when, on his defeat and death, the authority of Constantius was established.

IV.—During the fourth Century.

In A.D. 306, the Emperor Constantius died at York, and was succeeded by his son, Constantine the Great. In his reign, in his consulship with Licinius Cæsar, = A.D. 319, Pacatianus was his *Vicarius* in the island, as we learn from the Theodosian Code, xi., 7, 2.

Our only authority for the next fifty years is Ammianus Marcellinus, and his statements are very meagre. In xxx., 7, 5, he mentions *Gratianus Funarius,* the father of the Emperor Valentinian, who "Comes præfuit rei castrensi *per Africam *** et multo postea* pari potestate *Britannicum rexit exercitum.*" He is regarded as Governor by Horsley, *Brit. Rom.*, in A.D. 353, and by *Ed. Mon. Hist. Brit.*, p. 139, in "A.D. 350;" but it is plain that he was not *Vicarius*, but *Comes rei militaris.* See *Ammianus Marcellinus,* vol. iii., p. 455, l. Erfurdt.

n xiv., 5, 6, *Martinus* is noticed as holding the official rank in n of *pro præfectis,* and is also, in the same chapter, called

Vicarius. His administration of Britain may be placed in A.D. 353, as in *Mon. Hist. Brit.*, p. 139; Horsley, however, gives A.D. 355.

In xxiii., 1, 2, *Alypius* is mentioned, "qui olim Britannias curaverat pro præfectis." In *Mon. Hist. Brit.*, p. 140, he is placed in A.D. 360, and in *Brit. Rom.*, in A.D. 361; but neither of these dates seems to agree with the word *olim*, as used by Ammianus Marcellinus in describing an event* that, we know, took place in A.D. 363. From xx., 1, we learn that *Lupicinus* was sent over with an army to chastise the Picts and Scots. The words *consulatu Constantii decies terque Juliani*, seem to fix the date to A.D. 360, as given in *Mon. Hist. Brit.*, p. 140; but Horsley prefers A.D. 361.

The same historian, in xxviii., 8, informs us that Valentinian, having heard of a revolt in Britain, in which Nectaridus, *Comes maritimi tractus*, was killed, and Fullofaudes, the *Dux*, was in imminent danger, despatched to the island *Severus*, who was, at this time, *Comes domesticorum;* and it is stated that he sent before him *Provertuides* to collect an army. On his recall, *Jovinus* was appointed; subsequently, on receiving more alarming intelligence, *Theodosius* (father to Theodosius I.), an officer of high military reputation, was sent over. He subsequently applied for the appointment of *Civilis*, as Governor (*Vicarius*), and *Dulcitius* as General (*Dux*), and pursued a most successful career for about two years. The missions of Severus and Jovinus may be placed in A.D. 367; the arrival of Theodosius in A.D. 368, and his departure in A.D. 370. Horsley, *Brit. Rom.*, places the mission of Severus in A.D. 365; that of Jovinus in A.D. 366; and the arrival of Theodosius in A.D. 367.

The last notice that we find in Ammianus relative to Britain, is the incidental mention of *Fraomarius*, king of the Bucinobantes, who was sent into the island *potestate tribuni*, *i.e.* as commander of a body of auxiliaries. This may be placed about A.D. 370, as in *Brit. Rom.*, or A.D. 372, as in *Mon. Hist. Brit.*

In A.D. 383, the army in Britain proclaimed *Maximus* Emperor, as we learn from Socrates, v., 11, Zosimus, iv., 35, 5, 7, and Victor, *Epit.* The last Governor, whose name has been preserved, is *Chrysanthus*, mentioned by Socrates, i., 2.

In addition to the Governors already named, we must add those whose dates are unknown, and those whose title to this dignity is doubtful; viz.:

---

* The attempt by Julian to rebuild the temple at Jerusalem. Alypius was placed by th Emperor in charge of the work.

(*a*) *Claudius Xenephon* (*sic*); (*b*) *Modius Julius*; (*c*) *Æmilianus Calpurnius Rufilianus*; (*d*) *T. Flavius Postumius Varus*; (*e*) *Cogidubnus*; (*f*) *Octavius Sabinus*; (*g*) *Julius Pitanus*; (*h*) *Q. Antonius Isauricus*; (*i*) *T. Pomponius Mamilianus Rufus Antistianus Funisulanus Vettonianus*; (*k*) *Antistius Adventus**.

(*a*) Found at Little Chesters (*Vindolana*), Northumberland, and printed, Horsley, *Brit. Rom.*, p. 192, n. 21, *Brit. Rom. Inscrip.*, p. 136.

.........................GALLOR
........................VOTANV
..NIEIVS POR /RRIBVS..........
FVNDAMEN........ERVNT SVB..
CL · XENEPHO.......EG AV PR..
CVRANTE.......................

— — Cohors — *Gallorum devota numini ejus portæ turribus — — fundamenta — posuerunt sub — Claudio Xenephonte — Legato Augusti Pro Prætore curante — —*

(*b*) Found at Birdoswald (*Amboglanna*), Cumberland, and printed, *Archæol. Æliana*, N. S. i., p. 234, *Brit. Rom. Inscrip.*, p. 29.

SVB · MODIO IV
LIO LEG AVG PR ·
PR COH I AEL DC
CVI PRAEEST M
CL MENANDER
TRIB

Sub Modio Julio Legato Augusti Pro Prætore Cohors prima Ælia Dacorum cui præest Marcus Claudius Menander Tribunus.

(*c*) Found at Caerleon (*Isca Silurum*), Monmouthshire, and printed, Horsley, *Brit. Rom.*, p. 322.

IOVI · O · M · DOLICHV
I..ONI^{O} AEMILIANVS
CALPVRNIVS
RVFILIANVS..EC
AVGVSTORVM
MONITV

---

* In addition to these, Horsley mentions *Trebellius* as Governor, "but uncertain at what time." He is also noticed in Camden's *Britannia*, ed. Gough, i., p. 93.

Camden read this thus: *Jovi Optimo Maximo Dolicheno Junoni Optimæ Æmilianus' Calpurnius Rufilianus fecit Augustorum monitu.* This seems to be adopted by Horsley, *Brit. Rom.*, p. 323. I have but little doubt, however, that the last letter of the fourth line should have been read G, *i.e.* EG *scil.* LEG. Thus, Rufilianus was *Legatus Augustorum,* and *monitu* refers to the direction of the deities.

(*d*) Found at Caerleon, Monmouthshire, and figured, Lee, *Isca Silurum*, pl. iii., fig. 4.

T · FL · POSTVMIVS VARVS
V · C · LEG · TEMPL · DIANAE
RESTITVIT

Titus Flavius Postumius Varus Vir Clarissimus Legatus templum Dianæ restituit.

The usual addition to LEG · of PR · PR · is here omitted; but from the use of V · C ·, *Vir Clarissimus,* there is, I think, no doubt that Postumius Verus was Governor, not merely *Legatus* of the legion stationed at *Isca, scil.* the 2nd *Augusta.*

(*e*) Found at Chichester, Sussex, and printed, Horsley, *Brit. Rom.*, p. 192, n. 76.

[N]EPTVNO · ET · MINERVAE
TEMPLVM
[PR]O · SALVTE · DO[MVS ·] DIVINAE
AVCTORITA[TE · TIB ·] CLAVD
[CO]GIDVBNI · R · LEGA AVG · IN BRIT
[COLE]GIVM · FABROR · ET QVI · IN EO
.... D · S · D · DONANTE AREAM
.... ENTE PVDENTINI · FIL ·

Neptuno et Minervæ templum pro salute Domus Divinæ auctoritate Tiberii Claudii Cogidubni Regis Legati Augusti in Britannia Collegium Fabrorum et qui in eo (consistunt) *de suo dederunt donante aream — ente Pudentini filio.*

There seems no sufficient reason for doubting that the *Cogidubnus* of the inscription is the same as *Cogidunus,* mentioned by Tacitus, *Agricola,* 14: *Quædam civitates* Cogiduno regi *erant donatæ. Is ad nostram usque memoriam fidissimus remansit.* We may assume, then, that *Cogidunus* ruled those *civitates,* that were presented to him, as *Legatus Augusti.*

The use of *domus divina, i.e.* "the imperial family," is remarkable, for if this inscription was cut in the life-time of Cogidunus, it can scarcely have been later than the reign of Domitian, while the earliest of all other known examples of this phrase is in the reign of Marcus Aurelius.

(*f*) Found at Lancaster, and printed, *Mon. Hist. Brit.*, n. 76.

. . . .
. . [OB ·] BALINEVM REFECT
[ET · BA]SILICAM VETVSTATE CONLABSAM
[A] SOLO RESTITVTAM · EQQ · AL · SEBVSSIA
[NAE] SVB OCTAVIO · SABIN[O] VC
PRAESIDE · N · CVRANTE · FLA · AMMAV
SIO · PRAEF · EQQ · D · D · XI · KAL · SEPTEM ·
CENSORE $\overline{\text{II}}$ · ET · LIP . . O . . . . $\overline{\text{II}}$ · COSS

i.e. Ob balineum refectum et *basilicam vetustate conlapsam a solo restitutam equites Alæ Sebussianæ sub Octavio Sabino Viro Clarissimo Præside Nostro curante Flavio Ammausio Præfecto Equitum dono dederunt XI. Kalendas Septembres, Censore iterum et Lepido? iterum Consulibus.*

The date is unknown, as the year in which Censor and Lip. . . . were *Consules suffecti* has not been ascertained.

(*g*) Found at Cambeck, and printed, Horsley, p. 192, n. 43, *Brit. Rom. Inscrip.*, p. 219.

. . . .
OMNIVM
GENTIVM
TEMPLVM
OLIM VETVS
TATE CONIAB
SVM C · IVL
PITANVS
P · P · RESITUIT ·

Matribus *omnium gentium templum olim vetustate conlapsum Gaius Julius Pitanus primi pilus restituit.*

Horsley reads P · P ·, *Provinciæ Præses;* I prefer *Primipilus.* See *Brit. Rom. Inscrip.*, p. 220.

(*h*) Found at York, and printed, Wellbeloved, *Eburacum*, p. 90, *Brit. Rom. Inscrip.*, p. 216.

DEAE
FORTVNAE
SOSIA
IVNCINA
Q · ANTONI
ISAVRICI
LEG · AVG

i.e. Deæ Fortunæ Sosia Juncina (uxor) *Quinti Antonii Isaurici Legati Augusti.*

It is doubtful whether *Legatus Augusti* means Governor, or commander of the legion, stationed at York, *scil.* the 6th *Victrix.*

(*i*) Found at Chester, and printed, Smith, *Collect. Antiq.*, vi., p. 40.

FORTVNAE REDVCI
ESCVLAP ET SALVT · EIVS
LIBERT ET FAMILIA
I · IIMPONI · T · F · GAL · MAMILIAN
RVFI . . TISTIANI FVNISVL. N
VETTONIANI · LEG · AVG ·
D · D ·

Mr. Roach Smith, *Collect. Antiq.*, vi., p. 41, reads and explains this thus:—

"*Fortunæ Reduci, Æsculapio,* et *Saluti ejus Liberti et Familia Pomponii* (?) *T. Filii* (*Galeriæ*) *Mamiliani Rufi Antistiani Funisulani Vettoniani Legati Augustali dedicaverunt.* This altar was dedicated to Fortuna Redux, to Æsculapius, and to Salus (a combination of divinities, of which there are many examples in similar inscriptions), by the household (*liberti et familia*) of an imperial legate (most probably of the twentieth legion), of many names, occupying nearly three lines in the inscription. These names, indeed, present the only difficulty in the dedication, as the lettering is partially defective. They appear to belong to one individual, T.? Pomponius Mamilianus Rufus Antistianus Funisulanus Vettonianus, of the Galeria family."

To these observations are added the remarks of the Rev. J. Bathurst Deane, "on this hitherto unexplained inscription:—"

"I have reasons for thinking that T. Pomponius Funisulanus Vettonianus was legate of the twentieth legion about the year A.D. 295, or perhaps, somewhat earlier; and I believe him to have been adopted into the family of Funisulanus Vettonianus, mentioned by Tacitus, *Annal.*, xv., 7 (A.D. 72), whom I take to be the father of the L. Funisulanus Vettonianus (*circa* A.D. 100) who, was tribune of the sixth legion (Leg. vi. Vic.) in Britain, in the time of Nerva."

Mr. Smith's explanation is, in the main correct, but there are some points that require notice. GAL· stands for *Galeriâ, scil.* tribu, *Augustali* should have been *Augustalis*, or, rather, *Augusti*, and the meaning of EIVS seems to have been overlooked. It is scarcely possible that the pronoun can refer to *T. Pomponius*, &c.; I regard it as used for *ejus filiæ, i.e. Salus* his daughter, *scil.* of Æsculapius. There are similar examples of ellipsis both in Greek and Latin.

It is plain that Mr. Deane's remarks have been written without sufficient consideration. The date of the "Funisulanus Vettonianus, mentioned by Tacitus, *Annal.*, xv., 7," is not "A.D. 72," but A.D. 62; and it is impossible that "L. Funisulanus Vettonianus (*circa* A.D. 100)," or any one else, can have been tribune of the sixth legion (Leg. vi. Vic.) in Britain, in the time of Nerva, for that legion was not in the island until the time of Hadrian. Again, the date of "the L. Funisulanus Vettonianus" to whom Mr. Deane refers—*scil.* the same mentioned in the inscription cited by Brotier, in his *Notæ et Emendationes*, on Tacitus, *Ann.*, xv., 7—is not "*circa* A.D. 100," but *circa* A.D. 86, for the Dacian war in which he served was not that under Trajan, but that under Domitian. Nor is there any ground for supposing that the person named in the inscription was the son of the Funisulanus Vettonianus mentioned by Tacitus. It is plain that both notice the same person, who was *Legatus legionis quartæ*. On the inscription (cited by Brotier) found at *Turopoglys*, in Croatia, see Henzen, n. 5431, and especially Borghesi, *Giorn. Arcad.*, vii., p. 376.

What "the reasons" can be that Mr. Deane says that he has "for thinking that T. Pomponius Funisulanus Vettonianus was legate of the twentieth legion about the year A.D. 295, or perhaps somewhat earlier," I am wholly at a loss to conjecture. It is certain that an inscription was found at Chester, in which the 20th legion is mentioned, and in which, also, are found *Domini Nostri Augusti invictissimi*. Now, as these were, probably, Diocletian and Maximian, we may thus get a date for the presence of the legion there "about the year A.D. 295," but neither in that inscription, nor in any other record, is there evidence sufficient to warrant a conjecture as to the date at which *Pomponius Funisulanus* commanded the twentieth leigon: indeed, it is not certain that he ever commanded it at all.

(*k*) Found at Lanchester, Durham, according to *Mus. Ver.*, ccccxlv., 9, and *Orelli, Inscrip.*, n. 3403.

NVM · AVG · ET
GEN · COH · $\overline{\text{II}}$
VARDVLORVM
C · R · EQ · M · SVB · AN
TISTIO ADVEN
TO LEG · AVG · PR · PR
. . . . TIANVS TRIB

i.e. Numini Augusti et Genio Cohortis secundæ Vardulorum Civium Romanorum Equitatæ Miliariæ sub Antistio Advento Legato Augusti Pro Prætore — tianus Tribunus.

I am persuaded that this stone was not found in England. From Orelli, n. 1270, we learn that *C. Antistius Adventus* was Legate of Germany.

In Wright's *Celt, Roman, and Saxon,* p. 364, we have the following statements :—

> "C. Valerius Pansa occurs, as holding the same office [of proprætor] under Trajan, in an inscription found at Novara, in Italy, published by Muratori. Quintus Calpurnius is mentioned in an inscription found in Northumberland, believed to be of the age of Commodus."

Neither of these statements is correct. C. Valerius Pansa did not hold the office of proprætor, and the Quintus Calpurnius, to whom Mr. Wright refers, *scil. Quintus Calpurnius Concessinius,* was not legate, but merely a *Præfectus Equitum.* See *Brit. Rom. Inscrip.*, p. 193.

In *Mon. Hist. Brit.*, p. cxlvi., *C. Valerius Pansa* and *M. Mænius Agrippa,* are given as *Proconsules,* but in both these cases there is the same mistake, caused by reading PROC ·, *Proconsul,* instead of *Procurator.* See *Brit. Rom. Inscrip.*, p. 254. Britain was never a Proconsular Province; the Emperor himself was the only Proconsul of it, as of his other provinces. And yet we find in Lingard, *History of England,* i., p. 45: "*Pomponia Græcina,* the wife of the proconsul Plautius;" and in Merivale, *Hist. of the Romans under the Empire,* vii., pp. 79, 81: "Trebellius Maximus had mitigated the severity of the proconsular government,"—"Petilius Cerealis, the next proconsul," —"C. [Cn.] Julius Agricola, consul, A.D. 77; proconsul in Britain, A.D. 78." There was not one of those Governors who was a *Proconsul;* each of them was *Legatus Augusti Proprætore.*

With a view to facility of reference, I add a synopsis, giving the principal results of the foregoing examination.

FIRST CENTURY.

EMPERORS.	*GOVERNORS.					A.D.		
CLAUDIUS,	Aulus Plautius,	*Legatus*	*Augusti*	*Pro*	*Prætore,*	43	to	47
A.D. 41 to 54.	P. Ostorius Scapula,	“	“	“	“	47	to	*52
	A. Didius Gallus,	“	“	“	“	*52	to	
NERO,	A. Didius Gallus,	“	“	“	“	...		*57
54 to 68.	Quintus Veranius,	“	“	“	“	*57	to	*58
	C. Suetonius Paulinus,		“	“	“	*58	to	62
	C. Petronius Turpilianus,		“	“	“	62	to	*65
	Trebellius Maximus,	“	“	“	“	*65	to	
GALBA,	Trebellius Maximus.							
68 to 69.								
OTHO,	Trebellius Maximus.							
69.								
VITELLIUS,	Trebellius Maximus,	“	“	“	“	...		69
69.	Vettius Bolanus,	“	“	“	“	69	to	...
VESPASIAN,	Vettius Bolanus,	“	“	“	“	...		*71
69 to 79.	Petilius Cerealis,	“	“	“	“	*71	to	*75
	Sex. Julius Frontinus,		“	“	“	*75	to	78
	Cn. Julius Agricola,	“	“	“	“	78	to	*85
TITUS,								
79 to 81.	Cn. Julius Agricola.							
DOMITIAN,	Cn. Julius Agricola,	“	“	“	“	...		*85
81 to 96.	Sallustius Lucullus,	“	“	“	“	?...	to	...?
NERVA,								
96 to 98.	*C. Salvius Liberalis,*	“	“	“	“	?...	to	

SECOND CENTURY.

EMPERORS.	GOVERNORS.					A.D.		
TRAJAN,	*C. Salvius Liberalis,*	“	“	“	“			*99 ?
98 to 117.	†*L. Neratius Marcellus,*		“	“	“	?...	104	...?
HADRIAN,	†*A. Platorius Nepos,*		“	“	“	?...	124	...?
117 to 138.	Julius Severus,	“	“	“	“	?...	134	...?
ANTONINUS PIUS,	†Q. LOLLIUS URBICUS,		“	“	“	?...	*139	...?
138 to 161.	M. STATIUS PRISCUS,		“	“	“	?...	to	
M. AURELIUS AND VERUS,	M. STATIUS PRISCUS,	*Leg.*	*Augg.*	*Pro*	*Prætore,*			*161
161 to 169.	†CALPURNIUS AGRICOLA,	“	“	“		*162	to	...?
M. AURELIUS,								
169 to 177.								
M. AURELIUS AND COMMODUS,								
177 to 180.	ULPIUS MARCELLUS,	“	“	“		?...	to	*179

---

* The names in Roman letters, are of those mentioned as Governors only in histories, &c. in Italics, only in inscriptions; in Capitals, in both histories, &c., and inscriptions; and the Obelisk distinguishes those that are found in British inscriptions. The Asterisk, prefixed to a date, marks it as probable, not certain; and the mark of Interrogation indicates the want of information as to the beginning or end of the administration.

‡ The objection to this date, or to any other year of the joint reign of Marcus Aurelius and Commodus, as derived from the Benwell inscription, is that Xiphiline, lxxviii., 2, states that Ulpius Marcellus was sent by Commodus against the insurgent Britons. This may be met by the supposition that he continued in office up to the time of the outbreak, and was then sent by Commodus, not from the continent, but from the part of the island in which he then was, to the north, where the insurgents had crossed the barrier. This interpretation, however, seems unsatisfactory.

EMPERORS.	GOVERNORS.		A.D.
Commodus, 180 to 192.	†Ulpius Marcellus,	*Leg. Aug. Pro Prætore,*	... 184 ...?
	Helvius Pertinax,	" " "	*186 to*187
	D. Clodius Albinus,	" " "	*187 to ...
Pertinax. 193.	D. Clodius Albinus.		
Julian. 193.	D. Clodius Albinus.		
Severus, 193 to 198.	D. Clodius Albinus,	" " "	... 196
	†Virius Lupus,	*Leg. Augg. Pro Prætore,*	*196 to ...?

Third Century.

EMPERORS.	GOVERNORS.		A.D.
Severus and Caracalla, 198 to 211.	†*L. Alfenus Senecio,*	" " "	?...205-207...?
Caracalla and Geta, 211 to 212.			
Caracalla, 212 to 217.	†*Martius Julius Marcus,*	*Leg. Aug. Pro Prætore,*	?... 213 ...?
	†*Ti. Claudius Paulinus,*	" " "	?... to ...?
Macrinus, 217 to 218.			
Elagabalus, 218 to 222.	†*D. Junius,*	" " "	?... 219 ...?
	†*Marius Valerianus,*	" " "	?... 222 ...?
Severus Alexander, 222 to 235.	†*Marius Valerianus.*		
	†—— *Maximus,*	" " "	?... 225 ...?
Maximinus, 235 to 238.	†*S. Coccianus, ?*	" " "	?... 237 ...?
Gordian, 238 to 244.	†*Egnatius Lucilianus,*	" " "	?... to ...?
	†*Mæcilius Fuscus,*	" " "	?... to ...?
	†*Nonnius Philippus,*	" " "	?... 242 ...?
Philip, 244 to 249.			
Decius, 249 to 251.			
Galli, 251 to 254.			
Valerian and Gallienus, 253 to 260.	†*T. Desticius Juba,*	*Leg. Augg. Pro Prætore,*	?...254-260...?
Gallienus, 260 to 268.			
Claudius, 268 to 270.			
Aurelian, 270 to 275.			
Tacitus, 275 to 276.			
‡Probus, 276 to 282.			
Carus, 282 to 283.	M. Aurelius Carinus, *Cæsar.*		
Carinus and Numerianus, 283 to 284.			
Diocletian, 284 to 286.			

---

‡ Some have stated that this Emperor visited Britain, but the evidence is insufficient.

EMPERORS.	GOVERNORS.	A.D.
Diocletian and Maximian, 286 to 290.	M. Aurel. Valer. Carausius	287 to 293
Diocletian, Maximian, and Carausius, 290 to 293.	Allectus	293 to 296

Fourth Century.

EMPERORS.	GOVERNORS.	A.D.
Diocletian and Maximian, 293 to 305.		
Constantius and Galerius, 305 to 306.	Death of the Emperor Constantius, and elevation of Constantine in Britain.	306
Constantine and Galerius, 306 to 307.		
‡Constantine, Galerius, and Licinius, 307 to 310.		
‡Constantine and Licinius, 310 to 322.	Pacatianus, *Vicarius*	?... 319 ...?
Constantine, 322 to 337.		
Constantine II., Constantius II., and Constans, 337 to 340.		
Constantius II. and Constans, 340 to 350.		
Constantius II., 350 to 361.	Gratianus Funarius, *Comes rei Castrensis*	*350
	Martinus, *Vicarius*	?... *353 ...?
	Alypius, *Vicarius*	?... 365?...?
	Lupicinus, *Magister Equitum*	360
Julian, 361 to 363.		
Jovian, 363 to 364.		
Valentinian and Valens, 364 to 367.		
Valentinian, Valens, and Gratian, 367 to 375.	Nectaridus, *Comes maritimi Tractus*	367
	Fullofaudes, *Dux*	367
	Severus	367
	Jovinus	367
	Theodosius	368–370
Valens and Gratian, 375 to 376.		
Valens, Gratian, and Valentinian II., 376 to 378.		
Gratian and Valentinian II. 378 to 379.		
Gratian, Valentinian II. and Theodosius, 379 to 383.	Maximus proclaimed Emperor in Britain	383
Valentinian II. and Theodosius, 383 to 392.		
Theodosius, 392 to 395.	Chrysanthus, *Vicarius*	?... *393 ...?
Arcadius and Honorius, 395 to 408.	Marcus, Gratian, and Constantine, successively proclaimed Emperors in Britain	407
Honorius and Theodosius II., 408 to 423.		

---

† I have thought it unnecessary to give the years of the other *Augusti* of this period.

CHEMICAL NOTES.

BY H. CROFT,
PROFESSOR OF CHEMISTRY IN UNIVERSITY COLLEGE, TORONTO.

ON THE IODIDE OF BARIUM.

SOME years since the writer described the crystallised Iodide of Barium, and gave the formula, $Ba\,I + 7\,H\,0$. G. Werther has since examined a similar salt, but gives the formula, $Ba\,I + 2\,H\,0$, corresponding to the formulas of the bromide and chloride. He also describes the crystalline form as idential with that of the bromide, and states that the salt is deliquescent, and becomes reddish-brown in the air, instantaneously. He prepared the salt by acting on hyposulphite of barium with iodine, and filtering off from the tetrathionate of barium.

The writer prepared the iodide, for the former examination, by acting on baryta with iodine; but recently, by using sulphide of barium with iodine, and by Liebig's process with phosphorus. In each case the salt crystallised in long clear six-sided prisms, with flat terminal planes, no other faces could be detected. The crystals were not deliquescent in a dry atmosphere, on the contrary, they effloresced. No change of colour took place by some days exposure, farther than that they became opaque. By a strong heat iodine is evolved; but 23.61 per cent. of water can be driven out at 160° c.

The following analyses show the composition of the salt: in I. the water was determined by heating over a lamp, and is too high from loss of iodine; II. was formed from sulphide of barium; III. by means of phosphorus; and IV. is Werther's analysis, the water being calculated from the loss.

—				I.	II.	III.	IV.	V.
Barium	1	68.59	26.55	26.48	25.80	26.24	......	32.11
Iodine	1	126.88	49.08	......	48.44	48.50	......	59.46
Water	7	63.00	24.37	25.67	23.61	23.31	......	8.42
	...	258.47	100.00	......	97.85	98.05	......	......

In an attempt to form the salt by Werther's process, a small quantity was obtained, crystallising in the same form as the above, and efflorescing in the air. No salt with Werther's formula could be obtained.

On the Oxidation of Alkaline Arsenites.

Fresenius found that a solution of arsenite of potassium became rapidly oxidised, forming an arsenate, a change which would, of course, render it useless in volumetric experiments. On making some experiments on the subject, I was unable to discern the circumstances under which the strong oxidation described by Fresenius took place, as in my experiments less than one per cent. of arsenious acid was oxidised after a period of twelve months. Lately, a solution has come under my notice, in which at least twenty per cent. of the arsenious had become arsenic acid. The solution was very strong, and had deposited some of the arsenite as warty crystals. For accurate volumetric experiments it would, therefore, be advisable to examine the alkaline arsenite from time to time.

NOTES ON TRILINEARS.

In Vol. IX., No. 52, of this Journal, were given some illustrations of the use in trilinear coordinates of the equation to a line under the form

$$\frac{\alpha - f}{l} = \frac{\beta - g}{m} = \frac{\gamma - h}{n} = r,$$

where (α, β, γ) are the current coordinates, (f, g, h) the coordinates of some assumed point in the line, and r is the distance between these points.

The quantities l, m, n, being the sines of the angles between the line and the sides of the triangle of reference, when one of them is assigned the other two are determinate, and there must, therefore, exist two relations between the three. One such relation is well known to be

$$al + bm + cn = 0,$$

where a, b, c, are the sides of the triangle of reference. Another can be found as follows :—

Let $l = \sin\theta$, so that θ is the angle between the line and the side a. Then we have

$$-m = \sin(C+\theta) = \sin C\cos\theta + \cos C\sin\theta,$$
$$n = \sin(B-\theta) = \sin B\cos\theta - \cos B\sin\theta,$$

and, eliminating $\cos\theta$, $\sin\theta$, from these equations, we obtain,

$$m^2 + n^2 + 2\,mn\cos A = \sin^2 A.$$

This is one form of the relation sought for; but another form, involving all the quantities symmetrically, can readily be deduced by eliminating the product mn by aid of the first relation. Thus:

$$2\,bc\,mn = a^2l^2 - b^2m^2 - c^2n^2,$$

and, substituting this value,

$$a^2\cos A\,l^2 + b\,(c - b\cos A)\,m^2 + c\,(a - c\cos B)\,n^2 = bc\sin^2 A,$$

or,

$$\sin 2\,A\,l^2 + \sin 2\,B.\,m^2 + \sin 2\,C.\,n^2 = 2\sin A\sin B\sin C.$$

It is proposed to employ the above equation in the examination of the conic to which the triangle of reference is self-conjugate; viz.:

$$u\,\alpha^2 + v\beta^2 + w\gamma^2 = 0. \quad \ldots\ldots\ldots (1).$$

1. To find the conditions that the above conic may be a circle. Cutting the circle by the line

$$\frac{\alpha - f}{l} = \frac{\beta - g}{m} = \frac{\gamma - h}{n} = r,$$

the segments of the line intercepted between (f, g, h) and the circle are the values of r in the equation.

$$(ul^2 + vm^2 + wn^2)\,r^2 + (\ldots\ldots)\,r + uf^2 + vg^2 + wh^2 = 0. \quad \ldots\ldots\ldots\ldots\ldots\ldots (2).$$

If (f, g, h) be a fixed point, then, by a property of the circle, the rectangle under the segments is constant for all values of l, m, n; and, therefore,

$$ul^2 + vm^2 + wn^2 = \text{const};$$

but,

$$\sin 2\,A.\,l^2 + \sin 2\,B.\,m^2 + \sin 2\,C.\,n^2 = 2\sin A\sin B\sin C;$$

and, these being satisfied identically, we have

$$\frac{u}{\sin 2\,A} = \frac{v}{\sin 2\,B} = \frac{w}{\sin 2\,C},$$

and these are the conditions sought for.

2. To find the radius (R) of this circle:

Let the point (f, g, h) be the centre. Then

$$(ul^2 + vm^2 + wn^2) R^2 + uf^2 + vg^2 + wh^2 = 0,$$

or,

$$ul^2 + vm^2 + wn^2 = -\frac{1}{R^2}(uf^2 + vg^2 + wh^2);$$

but,

$$\frac{u}{\sin 2A} = \frac{v}{\sin 2B} = \frac{w}{\sin 2C},$$

$$= \frac{ul^2 + vm^2 + wn^2}{\sin 2A.\, l^2 + \sin 2B.\, m^2 + \sin 2C.\, n^2}$$

$$= -\frac{1}{R^2} \cdot \frac{uf^2 + vg^2 + wh^2}{2 \sin A \sin B \sin C}.$$

Again, (f, g, h) being the centre, we have

$$\frac{uf}{a} = \frac{vg}{b} = \frac{wh}{c}$$

$$= \frac{uf^2 + vg^2 + wh^2}{2\,\Delta}$$

Dividing the terms of the former equalities by these respectively, we have,

$$-\frac{1}{R^2} \cdot \frac{2\,\Delta}{2 \sin A \sin B \sin C} = \frac{a}{f \sin 2A} = \frac{b}{g \sin 2B} = \frac{c}{h \sin 2C}$$

$$= \frac{\dfrac{a^2}{\sin 2A} + \dfrac{b^2}{\sin 2B} + \dfrac{c^2}{\sin 2C}}{2\,\Delta}$$

and, therefore,

$$-\frac{1}{R^2} = \frac{2 \sin A \sin B \sin C}{(2\,\Delta)^2} \left(\frac{a^2}{\sin 2A} + \frac{b^2}{\sin 2B} + \frac{c^2}{\sin 2C}\right),$$

which expression is easily reduced to either of the following forms:

$$= \frac{1}{abc}(a \sec A + b \sec B + c \sec C)$$

$$= \frac{1}{2\,\Delta}(\tan A + \tan B + \tan C)$$

$$= \frac{1}{2\,\Delta}(\tan A \tan B \tan C)$$

3. To find the condition that the conic may be a rectangular hyperbola.

In this case, the equation (2) must be satisfied by the value infinity of r, for two distinct sets of values of l, m, n, and these directions are at right angles to each other. Hence

$$ul^2 + vm^2 + wn^2 = 0,$$

for two sets of values of (l, m, n); say, (l_1, m_1, n_1), (l_2, m_2, n_2), with the conditions,

$$l_1^2 + l_2^2 = 1, \ m_1^2 + m_2^2 = 1, \ n_1 + n_2^2 = 1.$$

Hence

$$ul_1^2 + vm_1^2 + wn_1^2 = 0,$$
$$ul_2^2 + vm_2^2 + wn_2^2 = 0,$$

and, by addition, we obtain

$$u + v + w = 0,$$

which is the condition sought for.

3. To discriminate the character of the conic (1).

If the conic be a hyperbola, the two sets of values of (l, m, n), which make one value of r to be infinite in equation (2) must be real; if a parabola, they must be equal; and if an ellipse, they must be imaginary. The condition of a value of r being infinite is

$$ul^2 + vm^2 + wn^2 = 0.$$

Eliminating n by aid of the relation,

$$al + bm + cn = 0,$$

we have

$$l^2 \left(u + w\frac{a^2}{c^2}\right) + m^2 \left(v + w\frac{b^2}{c^2}\right) + 2\, lm\, w\frac{ab}{c^2} = 0,$$

and the roots of this quadratic must be real, equal, or imaginary in the three cases.

Hence for the hyperbola, parabola, or ellipse, respectively, we have

$$\left(u + w\frac{a^2}{c^2}\right)\left(v + w\frac{b^2}{c^2}\right) \begin{array}{c}<\\=\\>\end{array} 0,$$

or

$$a^2vw + b^2wu + c^2uv \begin{array}{c}<\\=\\>\end{array} 0,$$

4. To find the axes of the conic (1).

Taking the point (f, g, h) for the centre, equation (2) gives for the value of the square of the semi-diameter (r) in any direction,

$$(ul^2 + vm^2 + wn^2)\, r^2 + uf^2 + vg^2 + wh^2 = 0,$$

which we will write for the moment,

$$ul^2 + vm^2 + wn^2 = -\frac{H}{r^2}.$$

The semi-axes being the greatest and least values of r, we must make r a maximum or minimum by the variation of l, m, n, subject to the condition

$$\begin{aligned} \sin 2A.\, l^2 + \sin 2B.\, m^2 + \sin 2C.\, n^2 &= 2 \sin A \sin B \sin C \\ a\,l + b\,m + c\,n &= 0. \end{aligned}$$

Hence we obtain

$$\begin{aligned} uldl + \text{anal} + \ldots\ldots &= 0, \\ \sin 2A.\, ldl + \ldots\ldots + \ldots\ldots &= 0, \\ adl + \ldots\ldots + \ldots\ldots &= 0; \end{aligned}$$

multiplying the two latter equations by arbitraries, λ, μ, adding, and then equating to zero the coefficients of the differentials, we obtain

$$\begin{aligned} ul + \lambda \sin 2A.\, l + \mu a &= 0 \\ vm + \lambda \sin 2B.\, m + \mu b &= 0 \\ wn + \lambda \sin 2C.\, n + \mu c &= 0 \end{aligned}$$

Multiplying these respectively by l, m, n, and adding, we obtain

$$-\frac{H}{r^2} + \lambda.\, 2 \sin A \sin B \sin C = 0,$$

or,

$$\lambda = \frac{1}{2 \sin A \sin B \sin C} \cdot \frac{H}{r^2};$$

also, transposing these equations,

$$\begin{aligned} -l = \frac{\mu a}{u + \lambda \sin 2A} &= \frac{\mu \cdot \frac{a}{\sin 2A}}{\frac{u}{\sin 2A} + \lambda} \\ -m &= \frac{\mu \cdot \frac{b}{\sin 2B}}{\frac{v}{\sin 2B} + \lambda} \\ -n &= \frac{\mu \cdot \frac{c}{\sin 2C}}{\frac{w}{\sin 2C} + \lambda} \end{aligned}$$

Multiplying these respectively by a, b, c, and adding, we obtain

$$0 = \frac{\frac{a^2}{\sin 2A}}{\frac{u}{\sin 2A} + \frac{P}{r^2}} + \text{anal} + \ldots\ldots,$$

where $P = \dfrac{H}{2 \sin A \sin B \sin C}$.

To find the value of H, we have, since (f, g, h) is the centre,

$$\frac{uf}{a} = \frac{vg}{b} = \frac{wh}{c}$$

therefore

$$= \frac{uf^2 + vg^2 + wh^2}{af + bg + ch} = \frac{H}{2\,\Delta}$$

and also

$$= \frac{af + bg + ch}{\frac{a^2}{u} + \frac{b^2}{v} + \frac{c^2}{w}} = \frac{2\,\Delta}{\frac{a^2}{u} + \frac{b^2}{v} + \frac{c^2}{w}}.$$

Hence

$$H = \frac{(2\,\Delta)^2}{\frac{a^2}{u} + \frac{b^2}{v} + \frac{c^2}{w}}.$$

Hence, finally, we have the quadratic, in which the values of r^2 are the squares of the semi-axes of the conic,

$$0 = \frac{\frac{a^2}{\sin 2A}}{\frac{u}{\sin 2A} + \frac{P}{r^2}} + \text{anal} + \ldots\ldots ,$$

where

$$\frac{1}{P} = \frac{2 \sin A \sin B \sin C}{(2\,\Delta)^2} \left(\frac{a^2}{u} + \frac{b^2}{v} + \frac{c^2}{w}\right).$$

J. B. C.

University College,
October 25th, 1865.

CONTRIBUTIONS TO BLOWPIPE ANALYSIS.

BY E. J. CHAPMAN, Ph.D.,
PROFESSOR OF MINERALOGY AND GEOLOGY IN UNIVERSITY COLLEGE, TORONTO.

The following notices comprise various blowpipe-tests and applications published by the writer within the last eighteen or nineteen years—together with two other applications of the blowpipe, published here for the first time, but already shewn to several persons interested in this method of research. Some of these tests have been appropriated by certain authors without the slightest acknowledgement; others have been incorrectly quoted; and some, again, appear to have escaped the attention of the editors of several recent works in which the applications of the blowpipe come under review. These reasons have led the writer to republish them, in the present place, in a condensed form, preparatory to the issue of an extended work on Blowpipe Practice, in which various new tests, and a large amount of other original matter, will be incorporated. This work will appear, it is hoped, early in 1866.

1. DETECTION OF LITHIA IN THE PRESENCE OF SODA.

[*First published in the Chemical Gazette: November* 15, 1850.]

This test may be applied to mixtures of these alkalies in the simple state, or to their carbonates, sulphates, nitrates, or other compounds capable of being decomposed by fusion with chloride of barium. The test-substance, in powder, is to be mixed with about twice its volume of chloride of barium, and a small portion of the mixture is to be exposed on a loop of platinum wire to the point of a well-sustained oxidating flame. A deep-yellow coloration of the flame-border, produced by the volatilization of chloride of sodium, at first ensues. This gradually diminishes in intensity, and after a short time, a thin green streak, occasioned by chloride of barium, is seen to stream from the point of the wire, as the test-matter shrinks further down into the loop. On the fused mass being then brought somewhat deeper into the flame, the point and edge of the latter will at once assume the rich crimson tinge characteristic of the presence of lithium compounds; and the colour will endure sufficiently long to prevent the slightest chance of misconception or uncertainty. The presence of strontium compounds does not affect this reaction, as these compounds, when fused with chloride of barium, cease to impart a red color to the flame (see No. 2). In order to ensure success, or rather to avoid the least risk of failure, in the application of this test, it is only necessary to keep up a clear and sharply-defined flame for about a couple of minutes. If the red coloration do not appear by that time, the absence of lithia

—unless the latter substance be present in traces only—may be safely concluded.*

2. METHOD OF DISTINGUISHING THE RED FLAME OF LITHIA FROM THAT OF STRONTIA.

[*First published in the Chemical Gazette: May* 1, 1848.]

It has been long known that the crimson coloration imparted to the blowpipe flame by strontia, is destroyed by the presence of baryta. This reaction, confirmed by PLATTNER—see, more especially, the *third* edition of his *Probirkunst,* page 107—was observed as early as 1829 by BUTZENGEIGER (*Annales des Mines, t.* v., *p.* 36). The latter substance, however, as first indicated by the writer, does not affect the crimson flame-coloration produced by lithia. Hence, to distinguish the two flames, the test-substance may be fused with 2 or 3 volumes of chloride of barium in a loop of platinum wire, the fused mass being kept just within the point or edge of the blue cone. If the original flame-coloration proceeded from strontia (or lime), an impure brownish-yellow tinge will be imparted to the flame-border; but if the original red colour were caused by lithia, it will not only remain undestroyed, but its intensity will be much increased.

This test may be applied, amongst other bodies, to the natural silicates, *Lepidolite, Spodumene,* &c. It is equally available, also, in the examination of phosphates. The mineral *Triphylline,* for example, when treated *per se,* imparts a green tint to the point of the flame, owing to the presence of phosphoric acid; but if this mineral be fused (in powder) with chloride of barium, a beautiful crimson coloration in the surrounding flame-border is at once produced.

---

* In testing this method, a mixture was prepared of 2 parts of ignited carbonate of soda with 1 part of carbonate of lithia, and portions of this were placed in six little porcelain capsules, distinguishing upon their under sides by a spot of ink; whilst into six similar but unmarked capsules, some carbonate of soda, only, was placed. The capsules being then arranged indiscriminately upon a tray, each was separately examined, and it was found that those which contained lithia could be separated from the rest without the slightest difficulty (November, 1850). This plan was repeated with equal success, on mixtures of 3 (NaO, CO^2) + 1 (LiO, CO^2), and 6 (NaO, CO^2) + 1 (LiO, CO^2), in May, 1865. When the lithia is in very small quantity, the blowpipe flame must not be too large.

3. DETECTION OF ALKALIES IN THE PRESENCE OF MAGNESIA.

[*First published in the Chemical Gazette : September*, 1847.]

In the analysis of inorganic bodies, magnesia and the alkalies (if present) become separated from other constituents towards the close of the operation. In continuation of the analysis, it then becomes desirable to ascertain, at once, whether magnesia is alone present, or whether the saline mass, produced by the evaporation of a portion of the solution, consists of magnesia and one or more of the alkalies, or of the latter only. By fusing a small quantity of the test-matter with carbonate of soda, the presence of magnesia is readily detected, as this substance remains undissolved; but the presence or absence of alkalies is not so easily determined, the coloration of the flame being frequently of too indefinite a character to afford any certain evidence on this point. The question may be solved, however, by the following simple process. Some boracic acid is to be mixed with the test-matter and with a few particles of oxide of copper, and the mixture is to be exposed for a few seconds, on a loop of platinum wire, to the action of an oxidating flame. In the absence of alkalies, the oxide of copper will remain undissolved; but if alkalies be present, an alkaline borate is produced, forming a readily fusible glass, in which the copper oxide is at once dissolved, the glass becoming green whilst hot, and blue when cold. If magnesia also be present, white specks remain for a time undissolved in the centre or on the surface of the bead. Any metallic oxide which imparts by fusion a colour to alkaline borates, may, of course, be employed in place of oxide of copper; but the latter has long been used in other operations, and is therefore always carried amongst the reagents of the blowpipe-case.

4. REACTION OF MANGANESE SALTS ON BARYTA.

[*First published in Chemical Gazette : August* 1, 1846.]

When moistened with a solution of any manganese salt, and ignited in an oxidating flame, Baryta and baryta compounds, generally, assume on cooling a blue or greenish-blue colour. This arises from the formation of a manganate of baryta. Strontia and other bodies (apart from the alkalies) when treated in this manner, become brown or dark-grey. A mixture of baryta and strontia also assumes an indefinite greyish-brown colour. If some oxide of manganese be fused with carbonate of soda so as to produce a greenish-blue bead or "turquoise enamel," and some baryta or a baryta salt be melted into this, the colour of the bead will remain unchanged; but if strontia be used in place of baryta, a brown or greyish-brown enamel is produced.

NOTE:—Some examples of *Witherite, Barytine, and Baryto-calcite,* contain traces of oxide of manganese. These, after strong ignition, often assume *per se* a pale greenish-blue colour.

5. DETECTION OF BARYTA IN THE PRESENCE OF STRONTIA.

[*First published in the Chemical Gazette : August* 1, 1846.]

This test is chiefly applicable to the detection of baryta in the natural sulphate of strontia; but it answers equally for the examination of chemical precipitates, &c., in which baryta and strontia may be present together. The test-matter, in fine powder, is to be melted in a platinum spoon with 3 or 4 volumes of chloride of calcium, and the fused mass treated with boiling water. For this purpose, the spoon may be dropped into a test-tube, or placed (bottom upwards) in a small porcelain capsule. The clear solution, decanted from any residue that may remain, is then to be diluted with 8 or 10 times its volume of water, and tested with a few drops of chromate (or bichromate) of potash. A precipitate, or turbidity, indicates the presence of baryta.

6. ACTION OF BARYTA ON TITANIC ACID.

[*First published in Chemical Gazette :* 1852.

Fused with borax in a reducing flame, Titanic acid forms a dark amethystine-blue glass, which becomes light-blue and opaque when subjected to the flaming process. The amethystine colour arises from the presence of Ti^2O^3: the light-blue enamelled surface, from the precipitation of a certain portion of TiO^2. The presence of baryta, even in comparatively small quantity, quite destroys the latter reaction. When exposed to an intermittent flame, the glass (on the addition of baryta) remains dark-blue, no precipitation of titanic acid taking place. Strontia acts in the same manner, but a much larger quantity is required to produce the reaction.

7. DETECTION OF OXIDE OF MANGANESE WHEN PRESENT IN MINUTE QUANTITY IN MINERAL BODIES.

[*First published in the Philosophical Magazine: February*, 1852.]

It is usually stated in works on the Blowpipe, that the smallest traces of maganese may be readily detected by fusion with carbonate of soda, or with a mixture of carbonate of soda and nitrate of potash: but this statement is to some extent erroneous In the presence of much lime, magnesia, alumina, sesquioxide of iron, or other bodies, insoluble, or of difficult solubility, in carbonate of soda, traces of oxide of manganese may easily escape detection. By adding, however, a small portion of borax or phosphor-salt to the carbonate of soda, these bodies become dissolved, and the formation of a "turquoise enamel" (manganate of soda) is readily effected. The process may be varied by dissolving the test-substance first in borax or phosphor-salt, and then treating the fused bead with carbonate of soda: the latter being, of course, added in excess. By this treatment, without the addition of nitrate of potash, the faintest traces of oxide of manganese in limestone and other rocks, are at once made known.

NOTE:—This method of examining bodies for the presence of manganese, was recommended by *Dr. Leop. H. Fischer* in 1861 (*Leonh. Jahrbuch:* [1861] 653), but the writer had forestalled him by nine years, having already described it in 1852—a fact apparently unknown to the editor of the 4th edition of Plattner's *Probirkunst*.*

---

* This new edition of Plattner's treatise, although containing some valuable additions from the pen of its editor, *Dr. Theodor Richter*, is not altogether free from errors of omission. One of these, the writer may perhaps be allowed to point out on personal grounds. In the third edition, p. 273, *Plattner* states under the head of cryptolite—"Das Verhalten dieses seltenen Minerals vor dem Löthrohre ist noch nicht ermittelt" In the new edition, *Dr. Richter* expands this statement as follows:—"Kryptolit (Phosphocerit)—Das Löthrohrverhalten dieses seltenen Minerals, welches beim Auflösen des grünen and röthlichen Apatits von Arendal, sowie des gerösteten Kobaltglanzes von Johannisberg in Schweden, in Säuren zurückbleibt, ist noch nicht ermittelt." Now, the blow-

8. METHOD OF DISTINGUISHING THE MONOXIDE OF IRON (FeO) FROM THE SESQUIOXIDE (Fe^2O^3) IN SILICATES AND OTHER COMPOUNDS.

[*First published in the Chemical Gazette: March* 1, 1848.]

This test serves to indicate, with great certainty, the presence or absence of FeO in bodies generally. It is performed as follows:—A small quantity of black oxide of copper (CuO) is dissolved in a bead of borax on platinum wire, so as to form a glass which exhibits, on cooling, a decided blue colour, but which remains transparent. To this, the test-substance in the form of powder is added, and the whole is exposed for a few seconds, or until the test-matter begins to dissolve, to the point of the blue flame. If the substance contain Fe^2O^3 only, the glass on cooling will remain transparent, and will exhibit a blueish-green colour. On the other hand, if the test-substance contain FeO, this will become at once converted into Fe^2O^3 at the expense of some of the oxygen of the copper compound; and opaque red streaks and spots of Cu^2O will appear in the glass, as the latter cools.*

NOTE:—Although this test is quoted by Plattner—perhaps the best criterion of its accuracy—it is passed over, without mention, in many works on chemical analysis. The writer may therefore be allowed to call to mind, in proof of its efficacy, that by its use in 1848 he pointed out the presence of FeO in the mineral *Staurolite* (*Chem. Gaz., July* 15, 1848; see also *Erdmann's Journal für pract. Chem.*, XLVI., 119), nearly thirteen years before this fact—now universally admitted—was discovered and announced by *Rammelsberg* (*Berichte d. Kongl. preuss. Akad. d. Wiss. zu Berlin: Marz*, 1861.)

---

pipe characters of Phosphocerite were given in a paper on that mineral, published in the journal of the Chemical Society of London in 1848; and these characters are referred to, from the paper in question, in the third volume of *Henry Watt's* English translation of *Gmelin's Handbuch*, published by the Cavendish Society in 1849, as well as in both the third and fourth editions of *Dana's* System of Mineralogy.

* Provided too much copper oxide be not dissolved in the glass—so as to become reduced *per se*—this test may be performed with either a reducing or an oxidating flame. If the method be tried with a few bodies of known composition (in some of which FeO is present, and in others absent) the operator will see, at once, that it offers no risk of failure—always assuming, of course, the absence of other reducing bodies, a point easily ascertained by the blowpipe.

9. DETECTION OF MINUTE TRACES OF COPPER IN IRON PYRITES AND OTHER BODIES.*

Although an exceedingly small per-centage of copper may be detected in blowpipe experiments, by the reducing process, as well as by the azure-blue coloration of the flame when the test-matter is moistened with chlorhydric acid, these methods fail in certain extreme cases to give satisfactory results. It often happens that veins of Iron Pyrites lead at greater depths to Copper Pyrites. In this case, according to the experience of the writer, the Iron Pyrites will almost invariably hold minute traces of copper. Hence the desirability, on exploring expeditions, more especially, of some ready test, by which, without the necessity of employing acids or other bulky and difficultly portable reagents, these traces of copper may be detected.† The following simple method will be found to answer the purpose :—The test-substance, in powder, must first be roasted on charcoal, or, better, on a fragment of porcelain,‡ in order to drive off the sulphur. A small portion of the roasted ore is then to be fused on platinum wire with phosphor-salt ; and some bisulphate of potash is to be added to the glass (without this being removed from the wire) in two or three successive portions, or until the glass becomes more or less saturated. This effected, the bead is to be shaken off the platinum loop into a small capsule, and treated with boiling water, by which either the whole or the greater part will be dissolved ; and the solution is finally to be tested with a small fragment of ferrocyanide of potassium ("yellow prussiate.") If copper be present in more than traces, this reagent, it is well known, will produce a deep red precipitate. If the copper be present in smaller quantity, that is, in exceedingly minute traces, the precipitate will be brown or brownish-black; and if copper be entirely absent, the precipitate will be blue or green—assuming, of course, that Iron Pyrites or some other ferruginous substance is operated upon. In this experiment, the preliminary fusion with phosphor-salt greatly facilitates the after solution of the substance in bisulphate of potash. In some instances, indeed, no solution takes place if this preliminary treatment with phosphor-salt be omitted.

---

* This method has not been hitherto published ; but it is inserted here, as it has been shown to various persons interested in blowpipe experiments. The same remark applies to No. 11.

† In Blowpipe Practice—as far, at least, as this is possible—the operator should make it an essential aim to render himself independent of the use of mineral acids and other liquid and inconvenient reagents of a similar character. If these reagents cannot be dispensed with altogether, their use, by improved processes, may be greatly limited.

‡ In the roasting of metallic sulphides, &c., the writer has employed, for some years, small fragments of Berlin or Meissen porcelain, such as result from the breakage of crucibles and other vessels of that material. The test-substance is crushed to powder, moistened slightly, and spread over the surface of the porcelain ; and when the operation is finished, the powder is easily scraped off by the point of a knife-blade or small steel-spatula. In roasting operations, rarely more than a dull red heat is required ; but these porcelain fragments may be rendered white-hot, if such be necessary, without risk of fracture. *Canadian Journal*, September, 1860.

10. DETECTION OF LEAD IN THE PRESENCE OF BISMUTH.

[*First published in the Chemical Gazette: Sept.* 15, 1848.]

When Lead and Bismuth are present together, the latter metal may be readily detected by its known reaction with phosphor-salt in a reducing flame—antimony, if present, being first eliminated; but the presence of lead is less easily ascertained. If the latter metal be present in large quantity, it is true, the metallic globule will be more or less malleable, and the flame-border will assume a clear blue color when made to play upon its surface, or on the sublimate of lead-oxide as produced on charcoal; but in other cases, this reaction becomes exceedingly indefinite. The presence of lead may be detected, however, by the following plan, based on the known reduction and precipitation of salts of bismuth by metallic lead: a method which succeeds perfectly with brittle alloys containing 85-90 per cent. of bismuth. A small crystal or fragment of nitrate of bismuth is placed in a porcelain capsule, and moistened with a few drops of water, the greater part of which is afterwards poured off; and the metallic globule of the mixed metals, as obtained by the blowpipe, having been slightly flattened on the anvil until it begins to crack at the sides, is then placed in the midst of the sub-salt of bismuth formed by the action of the water. In the course of a minute or even less, according to the amount of lead that may be present, an arborescent crystallization of metallic bismuth will be formed around the globule.

This reaction is not affected by copper; but a precipitation of bismuth would ensue, in the absence of lead, if either zinc or iron were present. These metals, however, may be eliminated from the test-globule by exposing this on charcoal for some minutes, with a mixture of carb-soda and borax to a reducing flame. The zinc becomes volatilized, and the iron is gradually taken up by the borax. If a single operation do not effect this, the globule must be removed from the saturated dark green glass, and treated with further portions of the mixture, until the resulting glass be no longer colored.

11. DETECTION OF ANTIMONY IN TUBE-SUBLIMATES.

In the examination of mineral bodies for antimony, the test-substance is often roasted in an open tube for the production of a white sublimate. The presence of antimony in this sublimate may be detected by the following process—a method more especially available when the operator has only a portable blowpipe-case at his command. The portion of the tube to which the chief part of the sublimate is attached, is to be cut off by a triangular file, and dropped into a test-tube containing some tartaric acid dissolved in water. This being warmed or gently boiled, a part at least of the sublimate will be dissolved. Some bisulphate of potash—either alone, or mixed with some carb-soda and a little borax, the latter to prevent absorption—is then to be fused on charcoal in a reducing flame; and the alkaline sulphide thus produced, is to be removed by the point of the knife-blade, and placed in a small porcelain capsule. The hepatic mass is most easily separated from the charcoal by removing it before it has time to solidify. Some of the tartaric acid solution is then to be dropped upon it, when the well known orange-colored precipitate of $Sb\,S^3$ will at once result.

In performing this test, it is as well to employ a somewhat large fragment of the test-substance, so as to obtain a thick deposit in the tube. It is advisable also to hold the tube in not too inclined a position, in order to let but a moderate current of air pass through it; and care must be taken not to expose the sublimate to the action of the flame—otherwise it might be converted almost wholly into a compound of $Sb\,O^3$ and $Sb\,O^5$, the greater part of which would remain undissolved in the tartaric acid solution. A sublimate of arsenious acid, treated in this manner, would, of course, yield a yellow precipitate, easily distinguished by its color, however, from the deep orange antimonial sulphide. The crystalline character, etc., of this sublimate, would also effectually prevent any chance of misconception.

12. THE COAL ASSAY.

[*First published in the Canadian Journal: May,* 1858 *; and in the Philosophical Magazine for July of that year.*]

In the practical examination of Coals, the following operations are essentially necessary :*—(1) The estimation of the water or hygro-

---

* To these might be added, the determination of the heating powers or "absolute warmth" of the coal, but this may always be estimated with sufficient exactness for practical purposes by the amount of coke, ash, and moisture, as compared with other coals. Properly considered, the litharge test, resorted to for the determination of the calorific power of coals, is of very little actual value. The respective results furnished by good wood charcoal and ordinary coke, for example, are closely alike, if not in favour of the charcoal; and yet experience abundantly proves the stronger heating powers of the coke. In practice, moreover, the actual value of a coal does not always depend upon the "absolute warmth" of the latter, as certain coals, such as brown coals rich in bitumen, may possess heating powers of considerable amount (as estimated by the reduction of litharge) though only of brief duration. Thus, the lignites of the department of the Basses Alpes in south-eastern France, and those of Cuba, yield with litharge from 25 to 26 parts of reduced lead; whilst many caking coals, practically of much higher heating power, yield scarcely a larger amount. When pyrites also is present in the coal—a condition of very common occurrence—the litharge test becomes again unsatisfactory, the pyrites exerting a reducing action on the lead compound.

As described, however, by Bruno Kerl, in quoting the writer's Coal Assay (*Löthrohr-Untersuchungen: Zweite Aufl.* 1862, p. 146) the so-called absolute warmth or heating power of a coal sample may be determined, if desired, in blowpipe practice, by the following modification of Berthier's method :—20 milligrammes of the coal, in fine powder, are to be mixed intimately with 500 milligrammes of oxy-chloride of lead (consisting of 3 parts of litharge + 1 part of chloride of lead, fused together and finely pulverized). The mixture is to be placed in a blowpipe-crucible, and covered with about an equal amount of the lead compound, a second cover of 8 blowpipe-spoonfuls of powdered glass + 1 spoonful of borax, being spread over this. The crucible, covered with a clay capsule, is then to be fitted into a charcoal block in the ordinary blowpipe furnace, over which a charcoal lid is placed, and the flame directed against its under side, so as to keep it at a red heat for from 5 to 8 minutes. The weight of the reduced lead divided by 20 gives the amount of the lead mixture reduced metric moisture present in the coal; (2) the determination of the weight and character of the coke; (3) the estimation and examination of the ash or inorganic matters; and (4) the estimation of the sulphur, chiefly present in the coal as FeS^2.

Estimation of Moisture:—This operation is one of extreme simplicity. Some slight care, however, is required to prevent other volatile matters from being driven off during the expulsion of the moisture. Seven or eight small particles, averaging together from 100 to 150 milligrammes, are to be detached from the assay specimen by means of the cutting pliers, and carefully weighed. They are then to be transferred to a porcelain capsule with thick bottom, and strongly heated for four or five minutes on the support attached to the blowpipe lamp, the unaided flame of the lamp being alone employed for this purpose. It is advisable to place in the capsule, at the same time, a small strip of filtering or white blotting-paper, the charring of which will give indications of the temperature becoming too high. The coal, whilst still warm, is then to be transferred to the little brass capsule in which the weighings are performed, and its weight ascertained. In transferring the coal from one vessel to the other, the larger pieces should be removed by a pair of fine brass forceps, and the little particles or dust afterwards swept into the weighing capsule by means of the camel's-hair pencil or small colour-brush belonging to the balance-case. The weighing capsule should also be placed in the centre of a half-sheet of glazed writing-paper, to prevent the risk of any accidental loss during the transference. After the weighing, the operation must always be repeated, to ensure that no further loss of weight occur. In place of the blowpipe-lamp, the spirit-lamp may be employed for this operation; but, with the former, there is less danger of the heat becoming too high. By holding a slip of glass for an instant, every now and then, over the capsule, it will soon be seen when the moisture ceases to be given off. It should be remarked, that some anthracites decrepitate slightly when thus treated, in which case the porcelain capsule must be covered at first with a small watch-glass.

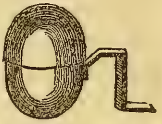
In good samples of coal, the moisture ought not to exceed 3 or 4 per cent., but in coals that have been long exposed to damp it is often

---

by 1 part of the coal. One part of pure carbon reduces 34 parts of this mixture; one part of charcoal, 30–33 parts; one part of bituminous coal, 19–33; one part of brown coal, 14–26; one part of peat, 8–27; and one part of wood, 12–15 parts.

as high as 6 or 7, and even reaches 15 or 20 per cent. in certain lignites. Where large quantities of coal are consumed, therefore, a serious loss is entailed on the purchaser unless the moisture be properly determined and allowed for.

Estimation, &c., of Coke :—In this operation, a small crucible of platinum is most conveniently employed. This may consist of a couple of rather deep spoons—the larger one without a handle, so as to admit of being placed over the smaller spoon, as in the annexed figure: thus serving as a lid. The long handle of the crucible-spoon must be bent as shown in the drawing, in order that the spoon may retain an upright position when placed on the pan of the balance. The spoon-crucible of this kind employed by the writer, weighs (with its lid) only 2.33 grammes, or rather less than 36 grs. About 150 milligrammes of coal are detached as before, in several small fragments, from the assay-specimen. These may be weighed directly in the crucible, the latter being placed in the little weighing capsule of horn or brass, with its handle-support projecting over the side of this. The crucible, with its cover on, is then taken up by a convenient forceps (see the note on page 19) and brought gradually before the blowpipe to a red heat. The escaping gases will take fire and burn for a few seconds around the vessel, and a small amount of carbonaceous matter may be deposited upon the cover. This rapidly burns off, however, on the heat being continued. As soon as it disappears, the crucible is to be withdrawn from the flame, and placed on the blowpipe-anvil to cool quickly. Its weight is then ascertained: always without removing the cover. The loss, minus the weight of moisture as found by the first process, gives the amount of volatile or gaseous matter. The residue is the coke and its contained ash. The coke in some anthracites exceeds 89 or 90 per cent. In anthracitic or dry coals it usually varies from 70 to 80 per cent., and the fragments are sometimes slightly agglutinated. In ordinary bituminous or caking coals, it amounts in general to about 65 or 70 per cent., and presents a fused and mamillated surface. In cannel or gas coals, the per centage of coke may be assumed to equal 50 or 60, but it is sometimes as low as 30. The coke fragments are often partially agglutinated, but they never present a fused, globular aspect. Finally, in lignites or brown coals, the coke may vary from 25 to 50 per cent. It forms sharp-edged fragments of a dull charcoal-like appearance, without any signs of fusion.

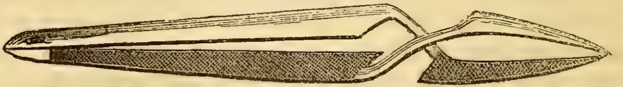


Estimation of Ash or Inorganic Matters :—A platinum capsule is employed for this operation. One of about half an inch in diameter, with a short ear or handle, is sufficiently large. A somewhat smaller capsule, with its handle cut off, may be fitted into this (in reversed position) to serve as a lid. The weight of the two together need not exceed 2½ or 2¾ grammes.* The coal must be reduced to a coarse powder, and about 150 milligrammes weighed out for the experiment. The platinum capsule is then to be fixed in a slightly-inclined position above the spirit-lamp, and heated as strongly as possible. If the wick of the spirit-lamp be raised sufficiently, and the capsule be light and thin, the temperature will be sufficient to burn off the carbon : at least, in the majority of cases. The lid of the capsule must be placed above the coal powder until combustion cease, and all the more gaseous products are driven off, as otherwise, a portion of the powder might very easily be lost. During the after combustion, the powder must be gently stirred, and if agglutination take place, the particles must be carefully broken up, by a light steel-spatula or by a piece of stout platinum-wire flattened at one end. If the carbonaceous matter be not burnt off by this treatment, the blowpipe may be used to acce-

---

* It is convenient to have counterpoises for the platinum vessels described above, as the weights which accompany the blowpipe-balance only range, in general, from a gramme downwards. A small platinum capsule forms an excellent counterpoise. It can be trimmed down by a pair of fine scissors until brought by repeated trials to the proper weight. The writer has cut out receptacles for two platinum vessels and counterpoises of this kind, in the little box into which his travelling balance packs; and he recommends other operators to do the same, as these vessels are of very convenient use, not only in coal assaying, but in ascertaining the amount of water in minerals, as well as for other purposes.

These platinum vessels are held most conveniently, during ignition, by a pair of steel forceps, of the annexed pattern, so constructed as always to remain closed at the points except when subjected to pressure. With forceps of this kind, the vessels in question may be taken up and disengaged in an instant, without the intervention of the right hand. The forceps may be laid down also, whilst the vessels are red hot, without risk of the latter coming in contact with the table.



E. J. C. *del.*

lerate the process; but the operator must blow cautiously, and direct the flame only against the under side of the capsule, in order to avoid the risk of loss. Finally, on the ash ceasing to exhibit in any of its particles a black color, the lid of the capsule is to be carefully replaced, and the whole cooled and weighed.*

In good coals, the amount of ash is often under 2 per cent., and it rarely exceeds 4 or 5 per cent. In coals of inferior quality, however, it may vary from 8 or 10 to even 20 per cent. As regards its composition, the ash may be:—(1) argillaceous, consisting essentially of a silicate of alumina; (2) argillo-ferruginous; (3) calcareous; and (4) calcareo-ferruginous. If free from iron, it will be white or pale grey; but if more or less ferruginous, it will present a red, brown, or yellowish color. Phosphor-salt, so useful in general cases for the detection of siliceous compounds, cannot be safely used to distinguish the nature of the ash obtained in blowpipe assays. Owing to their fine state of division and to the small quantity at command, argillaceous ashes dissolve in this reagent with as much facility as those of a calcareous nature, and without producing a characteristic silica skeleton, or causing the opalization of the glass. With calcareous ashes also, the amount obtained is rarely sufficient to saturate even an exceedingly minute bead of phosphor-salt or borax, and hence no opacity is produced by the flaming process. The one kind of ash, may be distinguished, nevertheless, from the other, by moistening it, and placing the moistened mass on reddened litmus-paper. Calcareous ashes always contain a certain amount of caustic lime, and thus restore the blue color of the paper. These calcareous ashes, also, though principally composed of carbonate of lime, sometimes contain small portions of phosphate and sulphate of lime. The presence of the latter may be readily detected by the well known production of an alkaline sulphide by fusion with carbonate of soda in a reducing flame—the fused mass exhibiting a reddish color, and imparting when moistened a dark stain to a plate of silver or piece of lead test-paper. The latter may be replaced by a glazed visiting-card. In examining earthy sulphates by this method, a little borax ought always to be added to the carbonate of soda, in order to promote the solution of the test-matter. If oxide of manganese be present in the ash, the well-known manganate of soda, or "turquoise enamel," will also be obtained by this treatment.

---

* If the ash be very ferruginous—in which case it will present a red or tawny color—the results, as thus obtained, will require correction: the original iron pyrites of the coal being weighed as sesquioxide of iron. In ordinary assays, however—as distinguished from analyses—this may be fairly neglected. When also the ash happens to be calcareous and to occur in large quantity, it should be moistened with a drop or two of a solution of carbonate of ammonia, and gently heated, previous to being weighed.

Estimation of Sulphur:—The following plan is perhaps the most simple that can be employed for the determination of sulphur in coal samples. It is merely an adaptation to blowpipe practice of the process very generally employed for that purpose:—

As large an amount of coal as practicable, several pounds at least, taken from different parts of the same heap or bed, must be broken into powder and well stirred together. About 150 milligrammes are to be weighed out for the assay. This amount is to be intimately mixed with about 450 milligrammes of nitrate of potash and an equal quantity of carbonate of potash, and the mixture, with a good covering of salt, is to be fused in a small platinum crucible of about a quarter of an ounce capacity. The crucible may be fixed in an ordinary blowpipe-furnace, in the centre of an already used charcoal-block, as the cavity of the latter will require to be larger than usual. The heat at first must be very moderate, as the mixture swells up greatly; but after a couple of minutes, or thereabouts, a tolerably strong blast may be kept up for from two to three minutes in addition, when the operation will be finished. The alkaline sulphate, thus produced, is dissolved out by boiling water, and the solution, acidified by a few drops of chlorhydric acid, is then treated with chloride of barium. The weight of the precipitate divided by 7.28 gives the amount of sulphur. An ordinary blowpipe crucible of clay may be employed for this operation; but it is always strongly attacked by the mixture during fusion, and is otherwise less convenient for the purpose than one of platinum.

When the iron pyrites in the coal is not in a state of semi-decomposition, its amount, and consequently the amount of sulphur, may be arrived at far more nearly than might at first thought be supposed, by the simple process of washing in the agate mortar. Each single part of pyrites corresponds to 0·533 of sulphur. Several large pieces of the assay-coal should be taken, and broken up into powder, and a couple of trials should be made on separate portions of this. About 500 milligrammes may be taken for each trial, and washed in three or four portions. In the hands of one accustomed to the use of the mortar in reducing experiments, the results, owing to the lightness of the coal particles, and the consequent ease with which they are floated off, come out surprisingly near to the truth. In travelling, we may dispense with the washing bottle, by employing, in its place, a piece of straight tubing drawn out abruptly to a point. This is to be filled by suction, and the water expelled with the necessary force by blowing down the tube. A tube 6 inches long and the fourth of an inch in diameter, will hold more than a sufficient quantity of water to be used between the separate grindings.* The mortar should be but slightly inclined, and the stream of water must not be too strong; otherwise, especially if the coal be ground up very fine, portions of the pyrites may be lost. The proper manipulation, however, is easily acquired by a little practice.

A Monograph on the British Spongiadæ. By J. S. Bowerbank, LL.D., F.R.S., F.L.S., F.G.S., F.Z.S., F.R.A.S., &c., &c. Vol. I., 1864.

AMONG recent contributions to Zoological science, a high place must be assigned to Dr. Bowerbank's researches respecting the Sponges. On occasion of the completion of his papers laid before the Royal Society we referred to the interest belonging to them, and gave a slight notice of his mode of arrangement, (vide Canadian Journal, vol. VII., p. 468). We would now direct the attention of our readers to the portion already published of his valuable monograph on the British Spongiadæ issued by the Ray Society. If he had chiefly occupied himself in this work with the characters and history of the genera and species occurring on the British coasts we should not have thought it likely to interest many in a country where the objects could rarely, if ever, be seen, even as preserved specimens in a museum, and where anything at all similar can rarely be found; but as the volume now before us is devoted to the anatomy and physiology of the Spongiadæ, a subject both curious and novel, which cannot fail to prove attractive to all lovers of nature, we have thought that any information we can give in the space at our disposal would prove generally acceptable, and might lead some to the study of an original, instructive, and beautiful book.

---

* In the third edition of his *Probirkunst*, p. 60, PLATTNER alludes to the use of a tube of this kind, as a make-shift for the washing bottle, in reducing operations; but in the new edition, this reference to its use is omitted.

The Spongiadæ should be regarded as a class of the subkingdom Protozoa, occupying an intermediate position between the Ciliata, or Infusoria, as that term is now limited, and the Rhizopoda, which may justly be regarded as exhibiting the lowest type of animal life. The Spongiadæ have been by many, and are still by a few, referred to the vegetable kingdom, but the characteristics of animal life are too plainly manifested by them for it to be easy, in consideration of what is now known of their structure, to resist the evidence which places them as not even the lowest of animals. If the true sponges are alone kept in view, Dr. Grant's name, Porifera, may seem most appropriate, but we cannot resist the inclination to place the Thallassicollidæ certainly, and the Gregarinidæ probably, in the same class, in which, (unlike the Rhizopoda,) whether single or associated in masses, each animalcule is enclosed by a special membrane or skin, but there is no oral or other definite aperture, the least possible differentiation of internal parts, and when there are cilia they are used to create currents through openings in a complex mass of animalcules, not for the purpose of individual locomotion. With this view of the class the name Porifera loses its applicability and another seems to be required, for still stronger objections lie against DeBlainville's name, Amorphozoa. We adopt Professor Reay Greene's definition of the highest class of Protozoa, which we prefer to call Ciliata rather than Infusoria, the latter term having been used very vaguely, and conveying no distinctive meaning. *Ciliata are animals belonging to the subkingdom Protozoa, provided with a mouth and rudimentary digestive apparatus; their bodies usually consisting of three distinct layers, the outer of which is, in most cases, furnished with a variable number of Cilia.* Rhizopoda may, we think, be defined: *Animals belonging to the subkingdom Protozoa, often contained in a hard enclosure of variable substance, but never having a differentiated skin or cilia; usually, perhaps constantly, with a nucleus, but with no other permanent distinction of parts; taking their food by protrusion of the sarcode which forms their substance so as to enclose the prey, and performing any movements of which they are capable by the same means, these protrusions being called pseudopodia.* Between these two classes comes in that of which we are now treating, and which we are disposed to define as follows: *Animals be-*

longing to the subkingdom Protozoa, having a more or less distinctly differentiated skin, sometimes furnished with cilia, and a nucleus, but with no other distinction of parts ; generally associated in masses, the common body being strengthened by hard parts which are usually spicula; nutrition always by absorption of dissolved animal and vegetable matter through the skin, there being neither mouth nor power of enclosing prey. It is the view here presented of sponge structure, supposing a sponge to be not an animal but a colony of closely united animals, partaking in a common life and common plans for figure, aeration and nutrition, each so-called amæbiform cell being a unicellular animal, one individual of the colony, which seems to us to justify the connection of the Thalassicollidæ, and even the Gregarinidæ, with Spongiadæ, as members of the same class, and taking the nutrition by absorption as the most peculiar characteristic we would propose for the class the name RHOPETICA.*

Dr. Bowerbank appears to us to treat the whole sponge as an animal, and the sarcode lining, composed of cells, which we consider as the animalcules, as being its digestive system. There are no doubt facts connected with the differences in different parts of sponges, and with their reproductive system which seem to favour this view, though we think them reconcilable with what we have proposed. But, leaving questions of this kind for the present, and limiting our attention to the true Sponges, which alone form the subject of Dr. Bowerbank's work, we will endeavour to collect some interesting particulars respecting their organization.

If a reader to whom the subject is altogether novel will inspect a piece of the sponge of commerce, he will observe that it consists of a flexible horny substance, seen with a magnifier to consist of a fine net-work of inosculated fibres, presenting everywhere minute pores on its surface, and having much larger openings scattered at intervals or raised on elevations above the general surface. He understands that this sponge has been cleaned from its animal matter, which consisted of sarcode (the animal substance of Protozoa—an homogenous animated jelly,) covering all the fibres so as to form a lining to the channels, but really made up of distinct cells, each having its own covering. A little inquiry will show that the sarcode is the constant feature whilst the skeleton may have its strength and figure given by siliceous or calcareous spicules, or even by regularly disposed particles of sand. It is found that water is absorbed by the smaller and more numerous openings, and forced along in currents which are believed to depend on the action of the cilia on some at least of the cells forming the lining, which water as it passes affords both aeration and nutrition to the cells, and is finally discharged through the larger openings called oscula. It is found, also, that certain specialized cells produce the reproductive elements, the matured ova being conveyed down the channels through which also gemmules which have budded out on the surface are carried forth to found new colonies. This is a general statement of what is known of the life of sponges and is common to them all. It will enable any one to understand the particulars which we have selected for notice. In the organization of sponges the spicula claim especial attention, and although their various forms have been favourite objects with the microscopist, the variety in their functions and the relations in which the different kinds occur in the same species, have chiefly become known through Dr. Bowerbank's labours. He divides the spicula primarily into 1. The essential skeleton spicula; 2. The auxiliary spicula. Of the former he speaks thus:—

---

* From the Greek 'Ροφέω, *absorbeo*, "animals living by absorption." Should the writer's view of the nature of Sponges be admitted, the new name is wanted, and he hopes will be found unobjectionable. If each Sponge is an individual animal, Dr. Grant's name Porifera should not be superseded. In that case I have nothing to suggest, respecting the affinities of Thalassicollidæ or Gregarinidæ.

> "In the siliceous sponges they are ususally simple, elongate in form, slightly curved, and occasionally more or less furnished with spines. They are either irregularly matted together, collected in fasciculi, or dispersed within or upon the keratose fibres of which the skeleton is to a great extent composed. Occasionally, but not frequently, they assume the triradiate form. In the calcareous sponges, beside the simple elongate form, the triradiate spicula are found in abundance.
>
> "All the elongate forms of spicula of the skeleton are subject to extreme variety in length. In some species they maintain a great degree of uniformity, while in others they vary to a very considerable extent according to the necessities arising from the mode of the construction of the skeleton. When the areas of the reticulations are large, they are generally long and rather stout, and are usually shorter when the proportions of the network are small and close. When enclosed in keratose fibre, they are most frequently smaller and shorter in their proportions than those in the Halichondroid sponges. And in those species in which they are dispersed over the membranous tissues, as in *Hymeniacidon*, Bowerbank, they are generally long, slender, and frequently flexuous. In the sponges of this structure having siliceous spicula the triradiate form of spiculum occurs but rarely, while in the calcareous sponges, which consist of membranes and dispersed spicula, the triradiate forms of skeleton spicula are the normal ones.
>
> "When the skeleton is constructed of large fasciculi of spicula, as in *Tethea* and

Geodea, they attain their greatest dimensions as essential spicula of the skeleton, frequently exceeding the eighth of an inch in length.

"The greatest known length of spicula occurs in the prehensile ones of *Euplectella aspergillum* and *cucumer*, Owen, where they are found to exceed three inches in length; and in *Hyalonema mirabilis*, Gray, where in the spiral column of the great cloacal appendage they reach the extreme dimensions of six ar seven inches in length; but in both these cases the spicula must be considered as auxiliary, and not essential forms.

"The larger number of forms of skeleton spicula are perfectly smooth, but in some species they are partially or entirely covered with spines.

"In every case they appear in the living state to have the capability of a change of position within the fibre to a considerable extent, in accordance with the natural alterations arising from the extensions or contractions of those tissues.

"The spicula are among the earliest developed organs of the sponge. Dr. Grant, in his valuable 'Observations on the Structures and Functions of the Sponge,' published in the 'Edinburgh New Philosophical Journal,' vol. I. p. 154, states that spicula are developed in the locomotive gemmules of *Halichondria panicea*, (*Hal. incrustans*, Johnston,) before they attach themselves for life and commence their development as fixed sponges. And in the gemmules of *Tethea cranium* they are abundantly developed even before the gemmules are detached from the parent, and some of them are forms peculiar to the gemmule.

"The growth of the spicula and their mode of extension appears to vary according to circumstances. Thus an acerate spiculum is at first short and very slender; as the development proceeds it increases in diameter, and appears to lengthen equally from the middle towards both ends; but in spinulate ones the increase in length does not appear to be effected in the same manner as in the acerate form, as we often find spinulate spicula fully developed at the base, while the shaft is exceedingly short and the apical termination hemispherical instead of acutely pointed, as in the adult state. As the shaft lengthens towards its full proportions, it attenuates; but in all the intervening stages the apical termination is usually more or less hemispherical."

His general account and subdivision of the auxiliary spicula is as follows:—

"Beside the spicula essential to the structure of the skeleton, there are several other forms of these organs, many of which, although not absolutely necessary in the structure of the skeleton, are of very frequent occurrence in subsidiary organs found in peculiar species and in particular genera. They may be conveniently classed under the following heads:

Connecting spicula.
Prehensile spicula.
Defensive spicula.
Tension spicula.
Retentive spicula.
Spicula of the sarcode.
Spicula of the ovaries and gemmules.

> "In the above designations of the auxiliary spicula, it must not be understood that their respective titles strictly define their offices, as it frequently occurs that under peculiar circumstances the same form of spiculum is destined to serve two, or even three, distinct purposes Thus, an external defensive spiculum will occasionally perform retentive offices for the purpose of securing prey; or internal defensive spicula will combine the offices of defensive spicula against the larger and more powerful of their enemies with that of wounding and securing their smaller ones."

It would lead us much too far to give particulars of the various and often wonderful forms which occur under the several heads here indicated. It was a very happy idea, the division of all the true sponges into three groups, according to the substance which forms their skeleton. These Dr. Bowerbank denominates Calcarea, Silicea and Keratosa. In the first two the skeleton is strengthened by the hard parts of which we have given some account; in the third it is composed of a peculiar substance, of the nature of which we will now give our author's statement:—

> "Keratode is the substance of which the horny elastic fibres of the skeleton of the officinal sponges of commerce are composed. It has, correctly speaking, no relationship either chemically or structurally with horn, and Dr. Grant has judiciously rejected the term 'horny fibre' as applied to the sponges of commerce, and has substituted that of keratose by way of distinction; and in accordance with that term I propose to designate the substance generally as keratode, whether it occurs in the elastic fibrous skeleton of true *Spongia*, which are composed almost entirely of this substance, or of those of the Halichondraceous tribe of Spongiadæ, where it is subordinate to the spicula in the construction of the skeleton, and appears more especially in the form of an elastic cementing medium. In a dried state in is often rigid and incompressible, but in its natural condition it is more or less soft, and always flexible and very elastic. It varies in colour from a very light shade to an extremely deep tint of amber, and it is always more or less transparent. In its fully developed condition, in the form of fibre, it appears always to be deposited in concentric layers; but in the mode of the development of these layers there are some interesting variations from the normal course of production. As we find in *Aranea diadema*, the common Garden Spider, that the creature has the power of modifying the deposit of the substance of its web so that the radiating fibres dry rapidly while the concentric ones remain viscid for a considerable period, so we find in the production of the young fibres of the skeletons of the Spongiadæ in some species, as in those of commerce, there is no adherent power at the apex of the young fibre, excepting with parts of its own substance; while in *Dysidea*. and in some other genera, the apex of the newly-produced fibre is remarkably viscid, adhering with great tenacity to any small extraneous granules that it may happen to touch in the course of its extension (Fig. 272, Plate XIV); but this ahhesive character appears to be confined to the earliest stages of its production only, as exhibited at the apices of the newly-produced fibres, the

external surface immediately below the apex exhibiting no subsequent adhesive property.

"Lehman, in his 'Physiological Chemistry,' Cavendish Society's edition, vol. I. p. 401, states that *Spongia officinalis* of commerce consists of 20 atoms of fibroin, 1 atom of iodine, and 5 atoms of phosphorus; and in treating of the physiological relations of fibroin as regards sponges, he observes: 'Its chemical constitution affords one of the arguments why the *Spongia* should be classed among animals and not among plants, since in the vegetable kingdom we nowhere meet with a substance in the slightest degree resembling fibroin.'"

Elsewhere he enumerates the following nine varieties of keratose skeleton fibre:

1. Solid simple keratose fibre.
2. Spiculated keratose fibre.
3. Hetro-spiculated keratose fibre.
4. Multi-spiculated keratose fibre.
5. Inequi-spiculated keratose fibre.
6. Simple fistulose keratose fibre.
7. Compound fistulose keratose fibre.
8. Regular arenated keratose fibre.
9. Irregularly arenated keratose fibre.

We cannot here enter at length on Dr. Bowerbank's speculations respecting the sarcode substance of sponges. He considers it as not merely the principal material of the body of Protozoa, but as closely related (if not identical) to the mucous lining of the intestine in the higher animals and the corresponding substance throughout the animal kingdom, but he views it as a whole as the most vital portion of each sponge. We have already stated our belief that we are to consider each insulated sarcode cell as an animalcule and the mass of the sponge as a great colony, the membranes and hard parts of which are to be compared with the common parts of Hydroids among Acalephæ, and of such Polypifera as Alcyoniums and Gorgoniads. According to this view the individual animalcule differs from an Amæba in being a cell enclosed by a membrane and nourished by absorption, and hence we denominate the class as *animals living by absorption,* and in the division of the Protozoan subkingdom which only admits of the lower three out of the five tendencies of development observable in the animal kingdom, we place this class as second of the three, or as corresponding to the fourth position in which an anomalous mode of obtaining food, frequently suctorial or extractive, is a characteristic. We do not apprehend that this difference as to the theoretical nature of a sponge is opposed by any of Dr. Bowerbank's facts, or would cause any but verbal changes in his statements. We regard the channels through a sponge as bearing some analogy to the central channel of a colony of Pyrosomata, though exhibiting a much more complicated structure. The nature and use of these channels are explained in the following passage by our author:—

"THE INTERSTITIAL CANALS AND CAVITIES.

"These organs exhibit their most complete mode of development in the genus *Spongia* and in the Halichondroid sponges, occupying nearly the whole of the masses of the animals. They consist of two distinct systems, an incurrent and an excurrent one. The incurrent series have their origin in the intermarginal cavities immediately within the dermal membrane, and their large open mouths receive from these organs the water inhaled through the pores, and convey it to the inmost depths of the sponge, ramifying continually like arteries as they proceed in their course downward, until they terminate in numerous minute branches. The inhaled fluid is then taken up by the minute commencements of the excurrent series, which continually unite as they progress towards the surface of the sponge, in the manner of veins in the higner animals, until they terminate in one or more large canals which discharge their contents through the oscula of the sponge. This system is found to obtain in the whole of the genus *Spongia* and in the massive Halichondroid sponges, which have their oscula dispersed over their external surfaces. By this mode of organization the inhaled fluid, laden with nutritive particles, is poured at pleasure into the internal cavities of the sponge, flowing over extensive membranous surfaces coated with sarcode; so that the aggregated surfaces become a great system of intestinal action, fully equal in proportional extent to that of the intestines of the most elaborately organized mammal.

They do not in every genus exhibit the regularity of structure described above, and in some cases the canalicular form resolves itself into a series of irregularly formed spaces. In other cases, where a common cloaca exists, there appears to be but one system of interstitial canals, those which convey the inhaled fluid from the pores through the substance of the sponge to the parietes of the great central cloacal cavity which receives the whole of the fæcal streams, rendering the system of excurrent canals unnecessary.

"In the Cyathiform sponges we find a somewhat similar structure. The outer portion of the cup is essentially the inhalant surface, and the interior of it the exhalant one, and there accordingly we generally find a great number of small oscula dispersed on all parts of it, very often having their margins slightly elevated, that the fæcal matter that issues may be discharged free of the surrounding membrane.

"The large fistular projections which form such striking and beautiful objects in the genus *Alcyoncellum* are also great cloacal organs, their dermal membranes abounding in pores, and their inner surfaces furnished with oscular orifices, the intervening space being occupied by the interstitial cavities, the interior forming one large cloacal cavity, which discharges its contents through a cribriform mouth at its distal end. In *Grantia* both systems, the incurrent and excurrent interstitial canals, become very nearly obsolete, but large intermarginal cavities or cells imbibing the water through their pores on the distal extremities, and becoming enlarged and elongated until they reach the parietes of the great central cloaca, into which they discharge their contents, each through a single osculum, into a short depression or cavity in the parietes of the great cloaca, and this shallow cavity represents the nearly obsolete system of excurrent canals."

The reproduction of sponges is as yet imperfectly understood, but as the ova and spermatozoa seem to have been distinctly observed in Tethea and ovarian vessels filled with ova are known in Spongilla, a regular reproduction by fertilized ova may be assumed to occur where it has not yet fallen under notice, and there is no doubt of gemmation also occurring; besides which, the colonies of animalcules which according to our idea constitute the sponge, occasionally divide, each portion separately increasing in numbers so as to form a complete new compound body. Many particulars respecting the known ovaria of sponges, and their germination internal and external are given by Dr. Bowerbank. A very important part of his work is also devoted to the explanation of his mode of classification, incomparably the best that has yet been proposed, and the discussion of the circumstances which afford the best characters for genera and species. The whole is illustrated by an admirable series of plates by Aldous, forming a most interesting specimen of what can be accomplished in the representation of microscopic objects. Of the value of the work as a contribution to natural science we feel that we cannot speak too highly. It adds to the important obligations conferred on science by the Ray Society, a happily planned association deserving extensive support, to which Canada ought to contribute more members than it has yet done.

W. H.

OBITUARY OF SCIENTIFIC MEN.

Death has been busy in the world of science since our last issue; and we must not omit to record our losses, though our readers may, most of them, have seen elsewhere fuller notices of the eminent men whom we can do little more than name with the respect due to their talents and worth.

Mr. Hugh Cuming, whose reputation is world-wide as a Natural History traveller and collector, and as a conchologist, possessing the finest series of shells ever brought together, died at his residence, Gower Street, London, on the 10th of August. He has contributed largely to the advancement of the

Natural Sciences; and none could see him without being impressed with his enthusiasm and his liberality in opening his vast stores to those interested in his pursuits.

Sir WILLIAM JACKSON HOOKER, Director of Kew Gardens, and one of the most eminent botanists of the age, as well as the possessor of one of the finest herbaria ever formed, died at Kew, on the 12th of August, having just completed his eightieth year. He was the author of upwards of fifty volumes of descriptive botany, and his labours only closed with his life. It is justly said of him, in the notice of his death in the *Athenæum:* "His address and bearing were singularly genial and urbane, and he was as remarkable for the liberality and uprightness of his disposition, as for the simplicity of his manners and the attractive style of his conversation." He has passed away at a ripe age, after devoting his whole life to the pursuit of science, deeply regretted by all who had the happiness of knowing him, universally esteemed as a public officer, and with a reputation second to none for the extent and accuracy of his botanical knowledge.

On the 2nd of September, Sir WILLIAM ROWAN HAMILTON, Astronomer Royal for Ireland, and eminently distinguished as a mathematician and astronomer, died at Dublin, at the age of 60. He was beloved for the kindness of his heart, and respected for the integrity of his character, as well as admired for the wonderful power of his intellect.

CANADIAN INSTITUTE.

SESSION—1864-65.

SECOND ORDINARY MEETING—10*th December*, 1864.

Rev. J. MCCAUL, LL.D., President, in the Chair.

I. The nomination of office-bearers for the ensuing year took place.

II. *The following Papers were read:*

1. By the Rev. W. Hincks F.L S., &c.:
   "On the King Vulture and other Birds of tropical America"; illustrated by specimens recently received.
2. By the Rev. H. Scadding, D.D.:
   "On Errata Recepta written and spoken."

THE ANNUAL GENERAL MEETING—17*th December*, 1864.

I. *The following Gentlemen were elected Members:*

WILLIAM FREELAND, ESQ., Toronto.
M. B. JACKSON, ESQ, Toronto.

II. *The following Donations for the Library were announced, and the thanks of the Institute voted to the donors.*

From Geographical Society, London.

Proceedings of Vol 8, 1–6, 1863–4	*1
Journal of 1862. Vol. 32	*1
From Geological Society, London.	
Quarterly Journal of February, 1864. Vol. XX., Part 1, No. 77	*1
May " " " 2, " 78	*1
August " " " 3, " 79	*1
The annual address by the President, 1864	*1
From Smithsonian Institution, Washington.	
Meteorologische Waarnemeregen, &c., 1863	*1
From the Publisher, John Lovell, Montreal.	
The Union of the Colonies by P. S. Hamilton	*1

III. The report of the Council for the year 1863–64 was read and adopted.

On Motion of S. M. Jarvis, Esq., seconded by S. Spreull, Esq.,

IV. The following gentlemen were declared Office-bearers and Council, without ballot, as only the requisite number had been proposed:

President, Vice Chancellor Hon. O. Mowat.

1st Vice-President,	Prof. E. J. Chapman, Ph. D.
2nd Vice-President,	Prof. G. T. Kingston, M.A.
3rd Vice-President,	M. Barrett, Esq., M.D.
Treasurer,	S. Spreull, Esq.
Recording Secretary,	W. Mortimer Clark, Esq.
Corresponding do	U. Ogden, Esq., M.D.
Curator,	W. B. McMurrich, Esq.
Librarian,	Rev. H. Scadding, D.D.
Council,	Rev. J. McCaul, LL.D.
Do	Prof. H. Croft, D.C.L.
Do	Prof. J. B. Cherriman, M.A.
Do	Hon. G. W. Allan, M.L.C.
Do	Dr. Tucker, Esq., M.D.
Do	C. B. Hall, Esq., M.D.
Do	Rev. W. Hincks, F.L.S., and Ex-officio as Editor of Journal.

THIRD ORDINARY MEETING—21*st January*, 1865.

The President, the Hon. Vice-Chancellor Mowat, in the Chair.

I. *The following Gentlemen were elected Members.*

Rev. L. W. Beck, M.A., Peterborough.
Kenneth Mackenzie, Esq., Q.C., Toronto.

II. *The following Donations for the Library were announced, and the thanks of the Institute voted to the donors.*

From Prof. A. D. Bache, Supt. U. S. Coast Survey:	
United Coast Survey, 1862	1
From Prof. D. Wilson, LL.D., Toronto:	
Smithsonian Report, 1862	1

From Vienna:

Mittheilungen die Kaiserlich-Koniglichen Geographischen Gesellschaft VI., Jahrgang, 1862	*1
The Law of Increase and the Structure of Man; by F. P. Liharzik, Vienna, 1862	*1

III. *The following Paper wvs read.*

By the President:

The ANNUAL ADDRESS.

FOURTH ORDINARY MEETING—28*th January*, 1865.

Vice-President, Prof. E. J. CHAPMAN, Ph. D., in the Chair.

I. *The following Gentlemen were elected Members.*

ALEX. WILKINSON, P.L.S., Sandwich.

W. HARRINGTON COWDRY, as Junior Member, York Mills.

II. *The following Paper was read:*

By Rev. Prof. W. Hincks, F.L.S., &c.

"Remarks on the Principles of Classification in the Animal Kingdom."

Prof. Chapman read a letter from Mr. Herrick, and made some remarks on some specimens of Minerals from the North shore of Lake Superior, exhibited by him.

III. Mr. G. A. Gilbert presented a Cube of Iron Pyrites from Peru, and two Photographs.

FIFTH ORDINARY MEETING—4*th February*, 1865.

The President, Hon. Vice-Chancellor O. MOWAT, in the Chair.

I. *The undernamed Gentleman was elected a Member.*

W. J. MACDONELL, Esq., Toronto.

II. *The following donations were announced for the Library:*

From Society of Antiquaries of Scotland:

Proceedings of, Vol. 4, Part 1, 1863	1
Do " 4, " 2, "	1
Do " 5, " 1, "	1
Memoir of Alexander Henry Kileind of Libster; by John Stuart, Scretary Society of Antiquaries of Scotland	*1

III. *The following Paper was read:*

By Prof. Wilson, LL.D.:

Some Observations on the Vocal utterances of Laura Bridgeman, the blind and deaf mute, in their bearing on questions in relation to the Origin of Language, made during a recent visit to Boston.

SIXTH ORDINARY MEETING—11*th February*, 1865.

Vice-President G. T. Kingston, M.A., in the Chair.

I. *The following Papers were read:*

1. By Dr. Wilson:

"On certain characteristic Types of Canadian Heads illustrated by the Conformeteur."

By Rev. H. Scadding, D.D.:

"On Anglicised German."

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST,—JUNE, 1865.

Latitude—43 deg. 39.4 min. North. Longitude—5 h. 17 m. 33 s. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resul't. Direction.	Velocity of Wind.					Rain in inches.	Snow in inches.
	6 A.M.	2 P.M	10 P.M.	Mean.	6 A.M	2 P.M	10PM	ME'N		6 A.M	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.		6 AM.	2 PM.	10 P.M.	Resul't.	ME'N		
1	29.691	29.696	29.627	29.6675	61.6	64.5	56.5	61.72	+ 4.77	.346	.273	.208	.276	63	44	45	49	N	E	E N E	N 84 E	6.0	6.6	2.8	4.04	4.21	...	...
2	.617	.674	.676	.6578	54.0	63.4	57.6	58.93	+ 1.67	.282	.322	.276	.281	67	55	58	57	N E b E	E	E S E	S 83 E	3 0	5.0	1.2	2.90	3.17	...	...
3	.657	.594	.558	.6003	56.2	68.8	65.2	64.23	+ 6.68	.339	.475	.445	.430	75	67	72	71	E b S	E S E	S W b W	S 10 E	3.0	1.0	1.5	0 76	1.63	...	...
4	.610	.552	—	—	70.6	82.9	—	—	—	.574	.639	—	—	76	56	—	—	Calm.	S W b S	Calm.	S 84 W	0.0	6.4	0.0	2.48	4.57	0.260	...
5	.750	.788	.776	.7738	63.0	67.7	62.3	64.28	+ 6.12	.462	.399	.359	.410	80	58	64	68	Calm.	E S E	Calm.	S 83 E	0.0	1.0	0.0	1.36	1.38	...	...
6	.801	.746	.700	.7407	61.2	68.8	65.9	65.85	+ 7.40	.386	.419	.449	.444	70	64	70	69	Calm.	E	S W	S 58 E	0.0	5.8	5.2	1.79	2.79	...	...
7	.669	.578	.662	.6310	66.3	76.7	65.2	69.95	+11.20	.562	.643	.458	.525	87	70	73	71	S W	S S W	Calm.	S 81 W	1.5	11.0	0.0	3.24	5.99	...	...
8	.731	.738	.707	.7258	59.8	72.8	63.7	66.27	+ 7.20	.335	.475	.391	.401	65	58	66	62	N W b N	S S W	S W b W	S 78 W	3.5	6.2	3.8	2.14	3.50	...	...
9	.723	.666	.575	.6470	61.6	70.2	59.0	63.25	+ 3.83	.405	.456	.380	.419	74	61	76	72	N	N E b N	Calm.	N 28 E	0.3	1.0	0 0	1.19	1.40	0.200	...
10	.516	.669	.700	.6402	59.0	66.6	50.0	58.50	— 1.32	.464	.426	.294	.386	93	64	81	78	N E b N	N N W	N W b N	N 27 W	1.5	15.5	5 6	8.52	8.58	...	...
11	.797	.720	—	—	51.1	61.6	—	—	—	.309	.346	—	—	82	63	—	—	N W b N	S b E	Calm.	S 30 E	2.0	2.0	0.0	1.48	1.88	...	..
12	.534	.455	.549	.5123	54.4	82.9	66.3	69.12	+ 8.85	.308	.606	.444	.471	73	54	68	65	Calm.	S W b W	N b W	N 67 W	0.0	7.5	7.8	2.48	4.33	...	...
13	.671	.721	.732	.7107	58.7	59.4	55.1	58.08	— 2.50	.350	.296	.277	.298	70	58	63	61	N	E b S	E b N	N 86 E	0.5	6.2	1.6	4.04	4.33	...	...
14	.775	.756	.682	.7308	58.0	64.5	60.1	61.35	+ 0.52	.304	.229	.293	.270	62	37	57	50	N E	E b N	E b N	N 74 E	3.2	14.2	12.5	10.48	10.61	...	...
15	.670	.705	673	.6805	58.0	59.4	59.1	59.53	— 1.60	.382	.446	.452	.442	79	88	90	87	E b N	E b N	E b N	N 79 E	1 5	4.8	3.5	3.15	3.17	0.530	
16	.687	.660	.699	.6763	62.7	74.2	65.2	68.25	+ 6.90	.530	.677	.550	.589	93	80	88	85	E b N	S E	Calm.	S 57 E	0.5	5.8	0.8	1.18	1.28	..	...
17	.750	.762	.701	.7328	64.8	81.1	69.2	71.38	+ 9.73	.582	.810	.655	.677	95	76	93	88	Calm.	S b E	Calm.	S 1 E	0.0	2.8	0 0	1.21	1.40	...	...
18	.707	.681	—	—	67.4	76.6	—	—	—	.506	.629	—	—	76	68	—	—	Calm.	Calm.	Calm.	S 71 E	0.0	0.0	0.0	0.50	0.52	...	...
19	.587	.586	.642	.6068	66.3	78.9	63.8	70.92	+ 8.78	.603	.725	.462	587	93	73	65	77	Calm.	S S W	N N W	N 26 W	0.0	0.5	3.8	1.91	2.45	...	...
20	.668	.639	.621	.6410	61.6	76.7	62.3	67.40	+ 4.95	.441	.452	.471	.463	81	49	84	71	N W	S S W	S W b S	S 35 W	4.3	9.0	1.8	3.77	4.21	...	...
21	.602	.615	.665	.6300	61.6	72.4	59.4	65.02	+ 2.35	.428	.326	.398	.395	78	41	78	66	Calm.	W	N W b W	N 79 W	0.0	15.0	1.5	4.59	4 94	...	...
22	.663	.707	.749	.7212	58.3	63.4	57.6	61.57	— 1.38	.321	.378	.309	.330	65	55	64	60	N	S b E	N b W	N 35 E	3.5	4.0	1.4	1.13	3.47	...	...
23	.851	.847	.791	.8222	57.2	67.4	60.9	62.20	— 0.95	.303	.391	.389	.355	64	58	72	63	Calm.	S b W	E S E	S 14 E	0 0	5.0	1.0	2.12	2.5	...	...
24	.729	.641	.586	.6188	64.8	78.9	71.7	72.05	+ 8.70	.450	.646	.531	.552	73	65	68	70	Calm.	S S W	S W b W	S 17 W	0.0	9.0	0.5	3.78	4.39	...	...
25	.551	.453	—	—	70.2	83.2	—	—	—	.608	.651	—	—	83	57	—	—	Calm.	S E b S	S W b S	S 7 W	0.0	7.5	5.9	4.56	4.90	0.550	...
26	.272	.216	.280	.2678	65.2	74.6	61.9	66.47	+ 2.58	.590	.593	.465	.529	95	68	84	81	S W b S	S S W	W b S	S 38 W	2.8	10.4	6.0	8.23	8.73	0.180	...
27	.371	.486	.570	.4310	54.0	59.4	52.2	55.38	— 8.68	.313	.296	.295	.303	75	58	73	70	S W b W	W	N W	S 73 W	8.2	13.0	11.8	7.84	8.75	...	...
28	.642	.630	.570	.6182	53.6	64.5	55.8	58.62	— 5.67	.318	.329	.383	.356	78	54	87	73	Calm.	S	S b E	S 25 E	0.0	1.6	3.2	2.00	3.77	0.215	...
29	.455	.333	.347	.3772	58.0	73.1	64.1	66.45	+ 2.00	.416	.542	.538	.514	86	65	90	79	E b N	S W b S	S W b S	S 34 W	3 8	15.8	8.0	3.96	5.72	0.070	...
30	.436	.519	.551	.5078	64.8	76.0	64.5	69.38	+ 4.80	.569	.504	.442	.516	92	56	73	72	S W b W	W b N	W	N 85 W	1.0	9.0	0.8	1.15	3.05	...	...
...	......	......	......	......	...	...	...	...	......	...	...	...	...	...	...	...	...	......	......	......	......	...	...	...	...	...	...	...
M	29.6357	29.6330	29.6304	29.6327	60.18	70.43	61.52	64.47	+ 3.44	.415	.458	.409	.432	78	61	73	70	....	....	....	....	1.67	6.75	3.07	......	4.06	2.005	......

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JUNE, 1865.

NOTE.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely, at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer . . . . 29.877 at 8 a.m. on 23rd. } Monthly range=
Lowest Barometer . . . . 29.232 at 4 p.m. on 26th. } 0.645 inches.

Self-registering Ther.
Maximum temperature . . . 90°.2 on 4th. } Monthly range=
Minimum temperature . . . 43°.0 on 11th. } 47°2
Mean maximum temperature . . 74°19 } Mean daily range=17°46
Mean minimum temperature . . 56°73 }
Greatest daily range . . . . 36°9 from a.m. to p.m. of 12th.
Least daily range . . . . 6°2 from a.m. to p.m. of 13th.

Warmest day . . . . 24th ...Mean Temperature . . . 72°05 } Difference=16°.67
Coldest day . . . . . 27th...Mean Temperature . . . 55°38 }

Maximum { Solar . . . . 128°5 on 19th } Monthly range=
Radiation { Terrestrial . . . . 33°4 on 11th } 95°.1

Aurora observed on 6 nights, viz.:—on 10th, 15th, 16th, 20th, 21st and 23rd.
Possible to see Aurora on 18 nights; impossible on 12 nights.
Raining on 7 days; depth 2 005 inches; duration of fall, 34.7 hours.
Mean of cloudiness=0.62; Most cloudy hour observed, 8 a.m; mean=0.70; least cloudy hour observed, 10 p.m; mean=0.53.

Sums of the components of the Atmospheric Current, expressed in Miles.

North.	South.	East.	West.
671.56	1043.54	882 24	1099.10

Resultant direction, S. 30° W.; Resultant Velocity, 0.60 miles per hour.
Mean velocity 4.06 miles per hour.
Maximum velocity 19.0 miles, from 8 to 9 a.m. on 27th.
Most windy day 14th—Mean velocity 10.64 miles per hour. } Difference 10.12.
Least windy day 18th—Mean velocity 0.52 miles per hour. }
Most windy hour, 1 p.m.—Mean velocity, 7.26 miles per hour. } Difference
Least windy hour, 5 a.m.—Mean velocity, 1.61 miles per hour. } 5.65 miles.

4th, Thunder storm during evening.
7th. Hot sultry day; thunder at 7 p.m. 8th. Lunar halo.
10th. Very fine auroral display 13th. Solar halo 7 a m.
16th. Distant thunder in N and W. 17th. Ground fog at night.
18th. Distant thunder in S. W.
19th Fireflies numerous. Dense fog during morning.
Dew recorded on five mornings during month.

The month of June was warm, dry, and calm. The mean temperature is the highest except 3 years, viz:—1841, 1853 and 1858.

COMPARATIVE TABLE FOR JUNE.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above Average	Maximum observed.	Minimum observed.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant. Direction.	Resultant. Velocity.	Mean Force or Velocity
1840	° 59.8	— 1.5	° 78.5	° 37.1	° 41.4	11	4.860	...	...	...	...	...
1841	65.6	+ 4.3	92.8	45.7	47.1	9	1.560	...	...	...	...	0.36 lbs
1842	5 .6	— 5.7	73.9	28.0	45.9	15	5.755	...	...	...	...	0.31 "
1843	58.4	— 2.9	81.3	28.5	52.8	12	4.595	...	...	...	...	0.27 "
1844	59 9	— 1.4	82.8	33 1	49.7	9	3.535	...	...	...	...	0 19 "
1845	61.0	— 0.3	83.6	40.9	42.7	11	3.715	...	...	...	...	0.27 "
1846	63.3	+ 2 0	83.3	41.5	41.8	10	1.920	...	...	...	...	0.32 "
1847	58.4	— 2.9	78.3	36.7	41.6	14	2 625	...	...	...	...	0.30 "
1848	62 9	+ 1.6	92.5	38.3	54.2	8	1.810	...	...	N 61 W	1.90	4.51 ms
1849	63.2	+ 1.9	84.9	45.2	39.7	7	2.020	...	...	S 71 E	0 43	3.32 "
1850	64.3	+ 3 0	83.2	49.0	34.2	10	3.345	...	...	S 60 W	0.3	4.54 "
1851	59.2	— 2.1	79.2	41.2	38.0	11	2.695	...	...	S 2 W	1.26	4.42 "
1852	60.8	— 0.5	86.1	43.6	42.5	10	3.160	...	...	S 76 W	1.49	4.09 "
1853	65.5	+ 4.2	86.3	43.3	43.0	9	1.550	...	...	N 1 W	0.10	3.73 "
1854	64.1	+ 2.8	88.7	47.4	41.3	9	1.460	...	...	N 24 E	0.71	4 15 "
1855	59.9	— 1.4	90.7	40.6	50.1	17	4.070	...	...	N 69 W	1.33	5.70 "
1856	62.1	+ 0.8	82.6	48.3	34.3	13	3.200	...	...	S 21 W	0.90	5.30 "
1857	56.9	— 4.4	75.1	40.9	34.2	21	5.060	...	...	N 49 W	1.15	7.60 "
1858	66.2	+ 4.9	86.3	48.7	37 6	12	2.943	...	...	S 20 E	0.25	5.53 "
1859	58 3	— 3.0	85.2	33.9	51.3	16	4.085	2	Inp.	N 77 W	1.95	7.19 "
1860	63.2	+ 1.9	81.1	50.0	31.1	14	2.136	...	...	N 44 W	3.13	7.61 "
1861	61.3	0.0	86.5	48.2	38.3	13	2.329	...	...	N 39 W	2.29	6.11 "
1862	60.5	— 0.8	83.2	44.3	38.9	10	1.007	...	...	N 26 W	1.77	5.98 "
1863	60.1	— 1.2	79.3	45.0	34.3	13	1.662	...	...	N 50 W	2.26	5.24 "
1864	63.0	+ 1.7	92.6	41.7	50.9	5	0.570	...	...	N 55 W	1.72	4.53 "
1865	64.5	+ 3.2	90.2	43.0	47.2	7	2.005	...	...	S 30 W	0.60	4.06 "
Results to 1864.	61.34	...	83.92	41.64	42.28	11.6	2.867	...	...	N 61 E	0.98	5 27
Exc. for 1865.	+3.16	...	+6.28	+1.36	+4.92	— 4.6	— 0.862	...	...	...	...	+1.21

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST.—JULY, 1868.

Latitude—43 deg. 39.4 min. North. Longitude—5 h. 17 min. 33 sec. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resultant Direction.	Velocity of Wind.					Rain in Inches.	Snow in Inches.
	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M.	2 P.M.	10 PM	ME'N		6 A.M.	2 P.M.	10 P.M.	M'N	6 A.M.	2 P.M.	10 P.M.	M'N	6 A.M.	2 P.M.	10 P.M.		6 A.M.	2 P.M.	10 PM	Resul't.	ME'N		
1	29.555	29.494	29.417	29.4898	63.4	68.4	64.8	65.30	+ 0.53	.521	.58	.528	.537	89	84	87	86	Calm.	E b S	W b N	S 77° E	0.0	11.0	3.0	1.70	3.47	Inp.	...
2	.421	.485	—	—	61.6	67.0	—	—	—	.468	.448	—	—	86	67	—	—	Calm.	W b S	W	S 88 W	0.0	19.0	0.9	7.62	7.80	0.025	...
3	.612	.594	.572	.5915	60.5	72.4	63.4	66.45	+ 1.30	.419	.468	393	.413	80	58	67	64	W	S S W	S W b W	S 40 W	0.8	10.0	0.5	4.28	4.50	...	...
4	.619	.608	.637	.6323	65.9	77.1	67.4	69.70	+ 4.40	.500	.418	.378	.410	78	44	56	57	W	S	N N W	S 50 W	3 0	6.0	6 0	4.36	6.23	...	...
5	.768	.766	.776	.7722	62.3	70 2	60.9	64.82	— 0.57	.348	.354	.331	.338	62	48	62	56	N	S S W	S S W	S 61 W	3.5	4.8	2.2	0.83	2 65	Inp.	...
6	.793	.639	.491	.6320	59.0	69.2	64.5	64.88	— 0.72	.439	.392	467	.446	88	55	76	74	N W	E	Calm.	N 74 E	3.0	8.5	0.0	1.80	3.92	0.050	...
7	.523	.556	.643	.5790	73.8	79.6	61.6	71.85	+ 6.15	.605	.454	.368	.477	72	45	67	61	W	W	NW b N	N 60 W	6.5	15.2	6.5	9.86	10.20	...	...
8	.658	.600	.575	.6050	63.0	76.0	61.5	67.35	+ 1.57	.462	.475	.430	.439	80	52	71	66	Calm.	S b W	W S W	S 33 W	0.0	8.0	1.0	3.50	3.89	...	...
9	.674	.723	—	—	61.6	71 0	—	—	—	.420	.394	—	—	76	52	—	—	N W b N	S b W	N N W	N 12 W	1.4	6.2	5.9	4.30	5.99	...	...
10	.771	.698	.576	.6737	59.1	68.1	61.9	64.65	— 1.43	.345	.270	.286	.309	68	39	52	51	N	E S E	Calm.	N 82 E	2.2	2.0	0.0	2.05	2.52	...	...
11	.542	.515	.507	.5167	60.1	73.8	64.1	66 87	+ 0.68	.366	.369	.409	.382	70	44	68	59	N E b N	S b W	Calm.	S 10 W	2.0	9.0	0.0	1.43	2.56	...	...
12	.503	.446	.518	.4832	60.5	72.8	52.6	62.73	— 3.57	.360	.436	.310	.3 6	69	54	78	67	Calm.	S S W	W N W	N 87 W	0.0	3.0	15.0	6.58	7.46	1.190	...
13	.573	.661	.707	.6532	54.4	63.4	51.8	56.23	—10.15	.298	.254	.300	.283	69	43	78	64	W b N	N W b N	W b N	N 57 W	14.5	18.0	2.2	11.29	11.83	...	...
14	.735	.693	.697	.7075	50.8	66.6	52 9	56.82	— 9.60	.283	.268	.274	.276	76	40	69	62	N W b W	W b N	Calm.	N 75 W	9.0	10.8	0.0	4.95	4.99	...	...
15	.699	.677	.659	.6820	49.0	61.6	52.6	55.75	—10.73	.297	.300	.279	.297	85	54	71	67	Calm.	S S E	Calm.	S 44 E	0.0	4.6	0.0	1.29	1.89	...	...
16	.608	.545	—	—	53.3	60.5	—	—	—	.312	.32	—	—	76	62	—	—	Calm.	E S E	Calm.	N 53 E	0.0	2.0	0.0	1.58	2.70	0.015	...
17	.530	.514	.521	.5192	58.7	72.0	58.3	63.80	— 2.88	.373	.23	.301	.29	75	28	60	52	N b W	N W b N	Calm.	N 41 W	5.2	13.0	0.0	6.13	6.37	...	...
18	.478	.398	.429	.432	60.1	80.0	61.2	66.98	+ 0.30	366	.327	.220	.314	70	31	40	47	W b N	W b S	S W	S 59 W	1.5	14.8	3.3	8.77	9.17	...	...
19	.408	.309	.336	.3472	59.8	62.7	59.0	60.73	— 6.05	.428	.433	.462	.447	83	75	93	84	S W.	S b W	Calm.	S 4 W	1.0	1.5	0.0	1.76	2.08	0.120	...
20	.480	.493	.569	.5227	58.0	74.9	66.3	66.10	— 0.67	.441	.518	.445	.464	92	59	68	73	E b N	S S W	N W	S 38 W	2.0	13.2	3 5	4.72	6.47	0.090	...
21	.691	.738	.689	.7072	61.9	65.6	65.5	65.72	— 1.05	.389	.403	.454	.437	70	63	72	69	N W b N	S S W	N N E	N 21 E	0 8	0.5	6.0	2.52	4.08	...	...
22	.772	.811	.775	.7845	61 9	68.4	64.1	64.75	— 2.12	.342	.390	301	.353	62	56	50	58	N E b N	S	N N W	N 46 E	5.0	7.4	5.5	0.87	4.97	...	...
23	.785	.707	—	—	59.1	73.5	—	—	—	.345	.399	—	—	69	48	—	—	N N W	S	Calm.	S 72 W	2.0	2.5	0.0	0.72	2.28	...	...
24	.723	.700	.638	.6792	59.4	71.3	64.5	65.73	— 1.13	.373	.416	.467	.428	71	55	76	68	Calm.	S S W	S S W	South.	0.0	2.5	2.0	1.54	2.33	Inp.	...
25	.491	.306	.312	.3575	63.4	70.6	65.6	66.93	— 0.03	.457	.646	.493	.518	78	86	77	78	E b N	S S W	S W b W	S 48 W	7.0	11.0	6.5	8.16	10.68	0.910	...
26	.383	.451	.545	.4648	65.2	78.9	67.0	70.78	+ 3.82	.459	.478	.498	.482	73	48	76	65	W b S	W b N	W N W	N 73 W	14.5	26.5	0.5	12.11	12.53	...	...
27	.560	.536	.490	.5272	63.0	80.3	63.2	70 45	+ 3.47	.462	.518	.420	.481	80	50	72	65	W N W	S W b S	Calm.	S 37 W	1.2	4.0	0.0	1.33	1.42	...	...
28	.499	.488	.506	.4948	69.9	77.1	66.3	71.50	+ 4.63	.626	.590	.419	.551	86	63	64	71	Calm.	S b W	N b W	S 52 W	0.0	5.2	3 8	1.40	3.35	0.070	...
29	.605	.646	.757	.6757	57.6	71.7	57.3	63.28	— 3.67	.446	.423	.302	.372	94	55	64	66	Calm.	S b E	N W b N	N 40 W	0 0	4.8	11.0	4.95	7.23	...	...
30	.846	.895	—	—	52.9	65.2	—	—	—	.296	.356	—	—	74	57	—	—	N b E	S b W	S S W	S 6 W	3.8	6.0	2.6	1.87	3.82	...	...
31	.955	.942	.910	.9345	54.0	66.6	57.3	60.38	— 6.57	.324	.278	.368	.324	78	43	78	63	W N W	E S E	E b S	S 79 E	1.0	8.8	4.0	5 72	5.99	...	...
M	29.6125	29.5877	29.5866	29.5948	60.57	71.51	61.48	65.02	— 1.23	.413	.412	.381	.402	77	53	69	65	....	....	....	....	2.93	8.38	2.96	......	5.34	2.470	.....

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JULY, 1865.

NOTE.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer..........................29.976 at 8 a.m. on 31st } Monthly range =
Lowest Barometer ....29.247 at 4 p.m. on 25th } 0.729 inches.

Self-registering Thermom.
Maximum Temperature ....83°0 on 28th } Monthly range =
Minimum Temperature ....45°8 on 15th } 37°2
Mean maximum Temperature ....74°14 } Mean daily range =
Mean minimum Temperature ....55°63 } 18°51
Greatest daily range......29°0 from a.m. to p.m. of 18th.
Least daily range..........11°6 from a.m. to p.m. of 22nd.

Warmest day......... 7th ..Mean temperature................71°85 } Difference = 26°10
Coldest day......... ..15th ..Mean temperature................55°75 }

Maximum Radiation. { Solar..........................126°5 on 7th } Monthly range =
{ Terrestrial .... 36°0 on 15th } 90°5

Aurora observed on 7 nights, viz:—7th. 13th, 14th, 17th, 18th. 19th, and 22nd.
Possible to see Aurora on 24 nights; Impossible on 7 nights.
Raining on 11 days, depth 2.470 inches; duration of fall 17.5 hours.
Mean of cloudiness = 0.53.
Most cloudy hour observed, 2 p.m.; mean = 0.60; least cloudy hour observed, 10 p.m.; mean, = 0.46.

Sums of the components of the Atmospheric Current, expressed in miles.

North.	South.	East.	West.
1213.98	1099.77	509.37	2199.28

Resultant direction N. 86° W.; Resultant velocity 2.28 miles per hour.
Mean velocity..........................5.34 miles per hour.
Maximum velocity..........................26.8 miles, from 9 to 10 a.m.
Most windy day.........26th...........Mean velocity, 12.53 miles per hour. } Difference =
Least windy day.........15th ....Mean velocity, 1.89 ditto } 10.64 miles
Most windy hour ...... 1 p.m.........Mean velocity, 9.18 ditto } Difference =
Least windy hour......12 p.m.........Mean velocity, 2.88 ditto } 6.30 miles.

1st. Very dense fog. 7th. Lunar halo, 10 p.m.
19th. Solar halo; dense ground fog at night.
20th. Dense fog a.m.
25th. Very heavy rain storm; brilliant rainbow, 7 p.m. 29th. Morning foggy.
Dew recorded on nine occasions during month.

The month of July, 1861, was cool and dry, while the mean velocity and mean cloudiness closely approximated to the average.

COMPARATIVE TABLE FOR JULY.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above aver'ge	Max. ob-served.	Min. ob-served.	Range.	No. of days.	Inches	No. of days.	Inches	Resultant. Direction.	Resultant. V'y.	Mean Force or Velocity.
1840	° 65.8	° − 1.2	° 79.4	° 48 2	° 31.2	6	5.27	...	...	...	...	....
1841	65.0	− 2.0	86.3	43.2	43.1	10	8.15	...	...	...	...	0 27 lbs.
1842	64.7	− 2.3	90.5	42.0	48.5	4	3.05	...	...	...	...	0.33
1843	64.5	− 2.5	86.1	40.2	45.9	8	4.60	...	...	...	...	0.44
1844	66.0	− 1.0	86.1	40.5	45.6	12	2.81	...	...	...	...	0.19
1845	66.2	− 0.8	94.6	45.6	49.0	7	2. 9	...	...	...	...	0.30
1846	68.0	+ 1.0	94.0	44.9	49.1	9	2.89	...	...	...	...	0.29
1847	68.0	+ 1.0	87.5	43.8	43.7	8	3.35	...	...	...	...	0.19
1848	65.5	− 1.5	82.7	46 7	36.0	10	1.89	...	...	N 14° W	0.18	4.94mls.
1849	68.4	+ 1.4	89 1	51.0	38.1	4	3.41	...	...	S 5° W	0.75	3.52
1850	68 9	+ 1.9	84.9	52.8	32.1	12	5.27	...	...	N 81° E	0.59	4.56
1851	65.0	− 2.0	82.7	52.1	30.6	12	3.62	...	...	N 60° W	0.88	4.13
1852	66.8	− 0.2	90.1	49.5	40.6	8	4.02	...	...	N 43° W	0.93	3.33
1853	65.6	− 1.4	85.4	49.4	36.0	10	0.91	...	...	S 58° E	0 24	3.19
1854	72.5	+ 5.5	93.6	53.0	40.6	9	4.80	...	...	S 49° W	0.37	4.03
1855	67.9	+ 0.9	88.4	53.1	35.3	13	3.24	...	...	S 19° W	0.73	6.47
1856	69.9	+ 2.9	92.0	51.4	40.6	8	1.12	...	...	N 79° W	1.57	5 84
1857	67.8	+ 0.8	85.4	52.4	33.0	15	3.47	...	...	S 68° E	0.81	4.74
1858	67.9	+ 0.9	83.4	55.9	27.5	13	3.07	...	...	N 15° E	1.13	5.76
1859	66.9	− 0.1	87.7	50.5	37.2	12	2.61	...	...	N 56° W	1.48	5.81
1860	63.9	− 3.1	85.8	47.5	38.3	13	4.33	...	...	N 60° W	2.15	7.29
1861	65.4	− 1.6	82.9	49.4	33.5	16	2.63	...	...	N 74° W	1.43	4.66
1862	66.7	− 0.3	88.6	52.6	36.0	15	5.34	...	...	S 89° W	1.42	5.80
1863	67.6	+ 0.6	82.3	49.3	33.0	15	3.40	...	...	N 18° W	0.40	3.89
1864	69.7	+ 2.7	87.9	52.9	35.0	8	1.33	...	...	N 61° W	2.23	6.00
1865	65.0	− 2.0	83.0	45.8	37.2	11	2.470	...	...	N 86° W	2.28	5.34
Results to 1864.	66.98	...	87.10	48.72	38.38	10.3	3.474	...	...	N 66° W	0.63	4.97
Excess for 1865.	− 1.98	...	− 4.10	−2.92	− 1.18	+ 0.7	− 1.004	...	...	....	...	+ 0.37

FOR THE ADVANC
OF SCIENCE.

THE

CANADIAN JOURNAL

OF

INDUSTRY, SCIENCE, AND ART:

CONDUCTED BY

THE EDITING COMMITTEE OF THE CANADIAN INSTITUTE.

CANADIAN INSTITUTE
ESTABLISHED 1849

NEW SERIES.   No. LX.

SMITHSONIAN INSTITUTION
MAY 28 1940
NATIONAL MUSEUM

NOVEMBER, 1865.

TORONTO:
PRINTED FOR THE CANADIAN INSTITUTE,
BY LOVELL AND GIBSON, YONGE STREET.

CANADIAN INSTITUTE.

EDITING COMMITTEE.

GENERAL EDITOR - - REV. WM. HINCKS, F.L.S.

I. *Geology and Mineralogy:* E. J. CHAPMAN, Ph.D., Prof. of Geology and Mineralogy, Univ. Coll. Toronto.

II. *Physiology and Natural History:* REV. WM. HINCKS, F.L.S., Prof. of Natural History, Univ. Coll., Toronto.

III. *Ethnology and Archæology:* DANIEL WILSON, LL. D., Prof. of History and English Literature, Univ. Coll., Toronto.

IV. *Meteorology:* G. T. KINGSTON, M.A., Director of the Magnetic Observatory, Toronto.

V. *Chemistry:* HENRY CROFT, D. C. L., Prof. of Chemistry and Experimental Philosophy, Univ. Coll., Toronto.

VI. *Mathematics and Natural Philosophy:* J. B. CHERRIMAN, M. A., Prof. of Natural Philosophy, Univ. Coll., Toronto; and the Rev. G. C. IRVING, M.A., Prof. of Mathematics, Trin. Coll., Toronto.

VII. *Engineering and Architecture:* SANDFORD FLEMING, C. E.

VIII. *Philology:* REV. E. HATCH, B.A., Prof. of Classics, Morin Coll., Quebec.

The Canadian Journal is printed exclusively for gratuitous distribution among the Members of the Canadian Institute, and such Institutions and Societies as the Council may determine; but Members may purchase extra copies at 2s. 6d. per number, and Provincial Literary and Scientific Societies may obtain the Journal at the same rate, by an annual payment in advance.

⁂ *Communications for the Journal to be addressed to the General Editor,* Prof. HINCKS, *Univ. Coll., Toronto. Communications on general business of the Institute, to be addressed to* U. OGDEN, *Esq., M.D., Corresponding Secretary, or to Mr. Jas. Johnson, Assistant Secretary, Canadian Institute, Toronto.*

☞ MR. EDWARD ALLEN, 12, Tavistock Row, Covent Garden, London, W, has been appointed the English Agent for the Institute. All European communications are requested to be forwarded through him.

THE CANADIAN JOURNAL

NEW SERIES.

No. LX.—NOVEMBER, 1865.

ON CHORISIS.

AS AN EXPLANATION OF CERTAIN VEGETABLE STRUCTURES.

BY THE REV. WILLIAM HINCKS, F.L.S., F.B.S. EDIN.,

HON. MEMBER OF THE LIVERPOOL LIT. AND PHIL. SOC., YORKSH. PHIL. SOC., BOT. SOC. OF CANADA, CORRESPONDING MEMBER OF THE ESSEX CO. INSTITUTE AND THE BUFFALO NAT. HIST. SOC., PROFESSOR OF NAT. HIST. UNIV. COLL., TORONTO.

It has of late years, been the aim of philosophical botanists to establish a few general laws of vegetable structure, capable of explaining all the phenomena which fall under our observation, so as to exhibit a common plan in all the various forms of plants, and show the kind of variations from the general type which occur in each particular instance, or in other words, to trace to the action of intelligible causes the peculiarities observable in each distinct structure, so as to show what is common to many, and how mutual relations are manifested in the midst of apparent diversities. This is, perhaps, to be accounted the highest and most interesting part of the study of nature, and if it must necessarily be preceded by the examination of the details of individual structures, always varied, curious, and attractive, it at least arises out of them as naturally as the philosophy of every science arises out of its facts and observations, combined and meditated upon by the highest intelligences amongst its votaries, aided at times by the happy thoughts of humbler labourers in the same field. I design now to bring under consideration one of the principles which has been proposed as a general expression of a number of facts in the structure of flowers, or, as a cause which may be assigned in explanation of some remarkable features belonging to particular flowers, explaining at once the relation to the common plan, and the meaning of the apparent descrepancy in the special case.

My subject is what was, I believe, first named by the French botanist Dunal, *chorisis,* a Greek word expressing *division* or *separation* and applied to supposed cases of a single organ in a floral circle being, so to speak, resolved by subdivision into a number of parts. At present, whilst many high authorities admit this principle as affording the true explanation of some remarkable facts in the structure of certain flowers, other authorities of not less general weight entirely reject the principle as unsupported by any sufficient evidence, and not needed to explain the phenomena. In such a case any contribution towards determining the point in dispute may be received with patience and may have some claim to attention. It may be expedient in the first place to consider what are the principles in relation to the structure and variation of flowers which may be regarded as known and established, and to what extent they go in explaining the appearances before us that we may be prepared to judge how far further assistance is required, and, if so, how far the proposed principle supplies what is wanted : nor will this view of what may be said to have been accomplished in an important field of enquiry be in itself destitute of utility since comparatively few years have changed the whole aspect of botanical science, and our greatest practical botanists continue to employ in decsription, terms founded on erroneous opinions, and suggesting false views where on so many accounts the utmost correctness of language is demanded, besides that the truths to be enumerated, though well established and admitted by those esteemed the best judges, are by no means so generally received and applied as not to require to be explained and enforced.

The 1st principle to be noticed is that every flower originates in an ordinary bud modified in its development, the increase of the axis being checked and the leaves reduced into circles and made to assume the characteristic forms of floral organs, which setting aside intermediate and anomalous ones are 4, described and named as follows : the exterior one, usually retaining most of the leafy character called as a whole the *calyx,* and its separate organs named *sepals* : within it another set of protective or enveloping parts, usually of a more delicate texture, and more likely to be colored, called the *corolla*, and its parts *petals*; then a set of organs so transformed as for the midrid to become a simple support called the *filament*, the lateral expansion to be contracted into cells forming the *anther*, whilst the superficial cells of its infolded surface are specialised into sperm cells called *pollen*. These organs as a whole are called *androecium* and singly *stamens*. In the remaining circle the leaves are made to bear on their margin or at their base *germ* cells called *ovules*, this expanded portion of the leaf or of several such leaves united being the *ovarium;* the apical portion generally drawn out to some length, is the *style*, and the naked glandular tip is the *stigma*. The whole circle of these leaves is the *gynoecium*, individually they are *carpels*. As there are four distinct modifications of leafy organs, forming in typical examples as many circles, there is a manifest convenience in having a name for each circle as a whole and for the parts of each, besides any names required to designate special portions of each organ. I have adopted names from good authority using care in their selection. The chief thing to be observed is the use of the term *gynoecium* for the whole of the inner circle and *carpel* for each separate part. I have judged it necessary to reject entirely the Linnaean term *pistil*, because, the true theory of the structure of the flower not being then understood, he used the term, sometimes for the whole circle of carpels when so united as to seem a single organ; sometimes for each separate style where the ovarian portions of the carpels are united, but their styles distinct, and sometimes for each carpel where they remained entirely separate, the word is useful enough in reference to the Linnæan artificial system, but cannot be employed to express what is now known without being a source of confusion. It is much to be regretted that eminent teachers of the science will persevere in employing it, especially as the evil is greatly aggravated by attempts to give the term a new meaning or to persuade us that Linnæus employed it in accordance with our modern ideas.

2. Having considered what seems well established, respecting the origin of the flower and the nature of its parts, what first claims our notice is the variation in the number of circles.

We have mentioned four differing in kind, but we may have one, two, or three of these absent, and we may have them increased by the occurrence of many circles of one kind of organ. The difference is in the development of the axis of the flower, which varies from a single circle to an indefinite number, the increase being chiefly in the inner ones. Whenever a flower presents a crowd of similar organs, whether manifestly in successive circles, or by their closeness thrown into a confused mass, the explanation which first occurs to the botanist is multiplication of the circles, whether there may be sometimes reasons for rejecting this and seeking another may be afterwards considered.

3. Our third principle relates to the position of the circles. The most natural and general is with the parts of each (the numbers conforming) alternate with those of the circles without and within it. This evidently depends on the same spiral plan of growth which produces the arrangement of leaves on a stem, the members of the successive circles being indeed produced in the same plane, but when some growth becomes necessary to obtain space for another circle, the advance of the axis being as usual spiral, and to a degree just sufficient to make the parts alternate, but besides that a whole circle may be so nearly suppressed by close pressure, as to be scarcely, if at all, perceptible, which would make those immediately within and without appear opposite, the alternation being maintained by the unnoticed intermediate circle, which is doubtless the true explanation of the stamens opposite to the petals in the Primrose family, it is quite conceivable that in certain cases the spiral course might be either prevented, or carried too far for alternation, the parts thus becoming opposite and abnormal examples occurring in which this is seen to take place, proves that we are justified in assuming it as a sufficient explanation of the rare instances in which adjoining circles with opposite parts occur. Dr Lindley has justly appealed to varieties of Camellia, in which the petals are ranged in regular lines, giving the flower a star-like aspect as proof of the possibility of the opposite arrangement taking the place of the alternate, and those who think otherwise are driven to the most extravagant suppositions to evade the force of his argument. But I must afterwards recur to this subject in another connection. At present I wish to show the real nature of the law of alternation, and the possibility of deviation from it in exceptional cases, without disturbing our idea of the plan of structure or driving us to imagine other causes in operation.

4. The degree and mode of development of the separate leafy organs which form each circle may vary from the smallest to the fullest extent, and through several remarkable differences of form. All the parts of the flower consist of leaves modified in their devolpment, and

each is capable of assuming any of the functions, for we have monstrous examples (and I quote none but what I have seen) of carpels occurring among the exterior parts of a half-transformed bud, petals and imperfectly-formed stamens being found within; of stamens with anthers present having stigmas at their tips and imperfect ovaries at their lower portion; of petals and stamens passing by all degrees into each other and of all the circles returning to leaves. Besides these there are well-known intermediate conditions such as used to be called nectaries, and besides the expanded or unfolded condition of an organ, tubular, hooded, and spur or horn-like enlargements are not unfrequently met with. The leading effects of varying development may, in addition to what has been already pointed out, be conveniently noticed under the following heads, connection or separation of parts; equality or inequality of the parts of a circle, and influences on the number of parts. As to the first of these, it is a law of vegetable structure, that portions of growing plants, whether of the same, or of closely allied kinds, being in contact and continuing so, for a time without agitation, will form tissue so as to unite and become as one. This law prevails in the parts of flowers as elsewhere. The result is coherence when organs of the same circle unite by their edges, adherence when organs of adjoining circles unite by their surfaces. Increased development of the parts promotes coherence; closeness of the circles promotes adherence, and differences in these particulars have much to do with the variations of the common plan of flowers.

We need not, however, be in any doubt as to the true explanation of what occurs, as we are familiar with cases of degrees of coherence from the slight attachment of the petals of a Flax or Woodsorrel to the complete union of these parts in a Convolvulus or an Erica, from the connection of the petals at the base only in some cases, to its reaching the very tip in others, and we may have seen a little starvation restore a Bellflower or Convolvulus to five separate petals.

It is necessary, to be able to express what happens in precise and accurate language, and as the terms *monosepalous, monopetalous,* affirm what is well known not to be true, and are fitted to obscure the ideas of students, whilst DeCandolle's terms, *gamosepalous, gamopetalous,* are figurative and too long, and have met with little acceptance, I take this opportunity of proposing terms long used by me, as a teacher, which seem fully to supply what is needed without being liable to objection. Let the coherent parts be called *synsepalous,* *synpetalous*, and if you please, *synandrous*, *syncarpellous*, whilst separation may be expressed by *aposepalous*, *apopetalous*, *&c.* Adherence arises from pressure of the circles on each other, or expansion of the torus or receptacle, so as to adhere sometimes outward on the lower part of the calyx, sometimes inward on the combined carpels, sometimes in connection with both, so as to place the fruit below the other circles of the flower and produce the epigynose structure—it readily explains many phenomena of common occurrence in flowers.

Regularity and irregularity of flowers depend entirely on the equal or unequal distribution of nutriment to the parts of the successive circles, the causes of which differences are often undiscernible, though the fact is certain. Sometimes the more developed parts are in all the circles on the same side of the flower ; in other cases the opposite sides are enlarged alternately. In other instances theirregularity is produced by an opposite pair being enlarged in each circle (where the whole number of parts is even), or by this arrangement being alternated in the successive circles. It must be evident how many modifications of flowers are explained by these considerations.

The primary law respecting number is found in the tendency to the number three in the circles of mono-coty ledonous plants, and to five in those of dicotyledonous plants. The first is an ultimate law of the organization of plants abundantly established by fact, but hardly capable of being connected, so far as we can at present see, with anything else we know of their nature. It may be doubted whether the second is not connected with the first in as much as one cotyledon or primordial leaf is found to imply a circle of three parts, two would therefore be expected to produce six, but this supposes the combination into one of two circles of three. Now we have other examples of this sort of combination of circles of parts exhibited to us by certain anomalous flowers, in sufficient number and variety of cases to suggest a sort of rule as to what is likely to happen, and from them we infer that in ordinary cases one part would be lost in the union. That under considerable pressure a part would be lost at each point of junction or two in the combined circle, whilst very close position, with circumstances unfavourable to development, such as give us occasional examples of two and one part in a monocotyledonous plant might occasion any of the lower numbers to occur in a dicotyledon. I found the explanation here given of the prevailing number of dicotyledonous plants on the careful examination of a considerable number of those monstrosities, not of very uncommon occurrence, in which two flowers are combined into one from their origin, owing to their buds having been adjacent. I can now distinctly recall examples in two or three species of Iris, and in at least three species of Oenothera, my cultivation at one period of numerous species of those genera affording me the opportunity of observing the anomalies to which they are liable. I had various instances of circles of five in the monster Iris and of seven in the Oenothera—one instance of four in the Iris in a single circle and one of only three, the exterior circles having five, and the tube showing sufficient marks of the union. In the Oenotheras observed, which embraced several species, there were uniformly seven parts in each circle, that is, seven sepals, seven petals, fourteen stamens and seven carpels. I gave some account of these monstrosities to the Linnæan Society in 1839, and it has since occurred to me that they establish a law respecting the combination of circles of growing parts, which may explain the tendency to the number five in Dicotyledonous plants, since, when growth is carried on from a single cotyledon, we find the number three in the circles, and where there are two cotyledons we might expect the circle to be double, but the fact of the loss of at least one part in combinations of two circles on the same plane shows why the number five takes the place of six. The liability of the natural numbers, five in Dicotyledonous and three in Monocotyledonous, to be reduced by mere pressure or by irregularity, is obvious from what has been already said. We find by observation that the number of parts in the successive circles of the flower is usually equal, but that the inner circle, being exposed to greater pressure, is apt to have fewer than the others—three and two carpels being very common in Dicotyledonous plants. In some structures the numbers in the different circles do not at all correspond, but this, which is characteristic of particular families, is less common, and its origin is one of the most obscure and dubious points in the theory of the flower. When parts are absent either from pressure or irregularity, we must remember that the fact is due to a special cause of abortion, not to the total absence of the part from the structure, and consequently that circumstances may occur from more abundant or equally distributed nourishment, which may in anomalous examples restore the missing part. Such examples are, indeed, almost needed to confirm our judgment as to the causes of the ordinary absence of these parts, and have therefore great interest for the philosophical botanist. In the natural family of the Onagraceze, to which the genera Fuchsia and Oenothera belong, the reduction by pressure of the natural number to four instead of five, and sometimes to a smaller number, is characteristic, but it is by no means uncommon to observe the restoration of the fifth part in both Fuchsias and Oenotheras under high culture, and, when it occurs at all, it takes place uniformly through all the circles. I have seen various examples in both genera. In the great order Fabaceæ, the Leguminous plants, a single carpel from abortion through irregularity of the rest of the circle is characteristic, but I have often met with kidney beans with two opposite carpels united by their edges so as to remind us of the maple fruit, and in Acer Pseudoplatanus, the Sycamore, I have found, instead of the usual pair of carpels, a complete circle. We are thus forced to admit that the parts deficient in particular structures are absent through abortion, but were rudimentally present in the bud, capable under favourable influences of being developed.

In fact the number five is very common in the exterior circles of Dicotyledonous plants, less so in the gynœcium, though often occurring there also; four is often produced both by pressure and by irregularity, three is occasionally found, and two rather more frequently, whilst in cases of the least amount of development, where the circles are reduced to two, or even one, a single organ in that circle is all that appears. In monocotyledonous plants the number three, and, from additional circles, its multiplies, is somewhat more constant, but abortion or degeneracy of organs from irregularity, is found throughout the Musal and Orchidal alliances and in grasses; and other irregularities of number occur. Our general laws of Floral structure, once understood, leave little difficulty in recognizing the proper explanation of the facts as they fall under our notice.

Having now shortly reviewed those principles which may be regarded as admitted among those botanists who apply themselves to the theoretical relations of the flower and its organs, tracing what is common and accounting for what is varied in the different structures, and having ventured to add one or two suggestions for improving these views or the mode of expressing them, we are prepared to estimate the evidence for any additional principle, where we have to judge whether the phenomena are susceptible of good explanation by the aid of those already established, or really require some new generalization for the correct expression of what occurs, and the perception of its true relations with other facts—and then whether the proposed principle agrees with and harmonises all the facts so as to be received as what we call a good explanation of them. The kind of facts which *chorisis* undertakes to explain are cases in which the symmetry of the flower as commonly understood would suggest the expectation of one organ, but we actually find two or more, and these in an unusual degree of proximity; cases in which the multitude of apparently distinct organs produced in close proximity seems inconsistent with the supposition of their belonging to successive circles; those in which a number far exceeding the natural number seems to be found distinctly in one circle, and those in which a number of similar organs are combined at their base in clusters, the number of clusters corresponding to what might have been expected to be the number of organs. All these are represented as being capable of explanation by collateral chorisis or the subdivision laterally of one organ into a number of organs. There is also a different class of facts, such as the occurrence of organs arising on the face of other organs and opposite to them: sometimes of lines of opposite organs, which being supposed inconsistent with other principles of structure, are explained as cases of *transverse* chorisis, or the division of a single organ into folds like the splitting of a card into two or even many similar or related organs. It cannot be denied that the cases to which chorisis has been applied as an explanation are attended with some difficulty, and that some of them are even incapable of plausible explanation by previously established principles. Some of them, however, appear to me quite consistent with those principles, as I shall endeavour to show when examining some alleged examples, and although it cannot reasonably be affirmed that such an operation as chorisis is inconceivable as arising from the nature of the organs of the flower, and it seems even to be sanctioned by some facts, yet I find myself obliged at least to limit its application within much narrower bounds than some able botanists have assigned to it. My reasons will be best given in an examination of the particular cases brought forward at least a sufficient number of them to justify a general opinion on the subject. I shall take the examples given by Dr. Gray, who adopts fully the theory of chorisis in his valuable work, the Botanical Text Book, pp. 250-255, having reference also to his remarks in "The genera of the United States Flora, illustrated." Dr. Gray's first example of collateral chorisis, on which he is disposed greatly to rely, is found in the Tetradynamous stamens of the natural family *Brassicaceæ*. This case I considered at large in a paper read before the Canadian Institute in Feby. 1860, and published in Vol. V. of the "Journal, p. 382, to which I now refer. I accept the quaternary symmetry in Brassicaceae, but consider the two lower stamens as part of an exterior circle of which two glands frequently present represent the other two members. I see no pretence for regarding the two pairs of stamens as each representing one divided organ, and I explained in consistency with my own view all the facts produced. Dr. Gray's second example is found in the androecium of Fumariaceae. This consists apparently of six stamens in two groups of three each, and Dr. Gray regards them as really two organs, each divided into three by collateral chorisis. It is to be observed that the two lateral stamens of each group have one anther each, while the central one has two. This suggested the theory of DeCandolle, supported by Lindley, that there are really two pairs of stamens, but those which were in the direction of the lateral pressure are split into halves, one half of each being pushed close to the stamens of the other pair, so as to place the perfect stamen of each end between two half stamens divided from the other pair. The Brassicaceous monstrosity recorded in which an outer stamen is split so as to resemble two each with a single anther, greatly supports this explanation which is favored also by the separated anthers, one on each side the column from the single stamen of many Orchidaceae and the instances of widely separated anthers with a partially divided filament. On this supposition there may be said to be a chorisis, but it is one of the most intelligible kind as there is no creation of an additional anther or of anything more than is present in the undivided stamen. It must be remembered that as chorisis is assumed to be a division from above, the three stamens in Dicentra being often quite distinct below and only coherent in the middle is very unfavorable to, I should almost say absolutely inconsistent with Dr. Gray's theory, and whilst this example is before us it is vain to appeal to the more complete union in other Fumariaceae, as it is an obvious case of coherence.

Dr. Gray's third example is one of those cases which appears to me to justify the admission of the principle of chorisis as occasionally giving us a satisfactory explanation of structures which without it seem incomprehensible. He refers to the three groups of stamens each completely united at their base in Elodea: justly observing that though the two outer circles in this flower are pentamerous, the inner ones three in number, the carpels, the three groups of stamens, and the three glands are trimerous so that each group of three connected stamens represents a single organ. The same is true of the organs seemingly representing abortive clusters of stamens in Parnassia, and the observation of Duchatre as to the development of the numerous stamens of Malvaceae from small protuberances representiug the single stamens of the original circle may be confirmed by any one who will examine with attention half-double Holyhocks in which intermediate states are found between bunches of stamens and unfolded petals.

The close bundles of stamens in Ricinus and the fan-like groups in some Myrtaceae may be of the same kind. Admitting then, the principle to a certain extent, we need not multiply examples. The difficulty is that, supposing the seattered parts of a vascular bundle which forms the leaf to supply the filaments of a bundle of stamens, we should anticipate the divided expansion giving only one cell to each anther, as is the case in Malvaceae, but in other cases referred to we have two-celled anthers resulting from the divided leaf, a real difficulty without doubt, yet not sufficient, perhaps, to overcome the reasons in favour of the theory.

Transverse chorisis is quite a different thing and far more incredible than what has thus far been discussed. The leaf of a Horse-chestnut, a Virginian creeper, or a Lupin, occurs to us as a ready illustration of the possibility at least of collateral chorisis, and it being satisfactorily proved that an ordinary stamen is but a leaf developed under peculiar circumstances, a leaf becoming a group of connected stamens cannot seem entirely opposed to our reason, each portion of the leaf has its own vascular bundle to form the filament and its own cellular expansion to form the anther. But when we are told of that which is but a thin lamella of organized substance, with its two surfaces differently constructed, and its intermediate portion quite distinct from both, splitting in planes parallel with its surface so as from the one to produce a number of similiarly expanded organs possessing the same general structure as the undivided organ would have done, we may well exclaim against the extravagance of such an assumption, and we try in vain to think of any thing which appears to justify it. A carpel is but a leaf in a peculiar state of development, and as it advances towards maturity as a fruit, we can often separate in a direction parallel with its surface three portions, the epicarp or outer surface, the mesocarp or vascular and intermediate portion, and the endocarp, the inner lining of the fruit corresponding to the upper surface of the ordinary leaf; but these three parts though often separable in fact, and always in idea could none of them exist as living parts without the others, they are different portions of one organized substance, and the consideration of the sense in which they are different, only the more impresses us with the impossibility of supposing such elements as would ordinarily produce one leaf, capable of producing, under any stimulus, many leaves standing in parallel planes, each containing all the parts of the one. But it may, perhaps, be thought that there is some other mode of representing this matter not liable to the preliminary objection here offered. Dr. Gray, who probably presents the subject as judiciously and plausibly as any one has done, and whose authority would justly go as far as mere authority ever can, is disposed to treat the question as one of fact, as if he said: it cannot be denied that examples occur of multiplication of organs opposite to one another in the flower which do not admit of explanation by their belonging to successive circles—these facts claim consideration whether we can explain them or not, but when stated, an explanation may be attempted—accordingly he begins by putting aside the theory to which my remarks above directly apply, in the words: "The name *dédoublement* of Duval, which has been translated *deduplication*, literally means *unlining;* the original hypothesis being, that the organs in question *unline*, or tend to separate into two or more layers, each having the same structure. We may employ the word *deduplication*, in the sense of the doubling or multiplication of the number of parts, without receiving this gratuitous hypothesis as to the nature of the process, which at best can well apply only to some special cases. The word chorisis, also proposed by Duval, does not involve any such assumption, and is accordingly to be preferred." He adds, respecting transverse chorisis: "Some examples may be adduced before we essay to explain them." I am myself disposed, nevertheless, to endeavour to understand and consider the theory proposed, and then try its application to the facts. These facts are certain phenonena in flowers which are, if possible, to be brought under general laws of structure. Is it certain that laws previously known do not apply to them? and if this must be admitted is the hypothesis called transverse chorisis the only possible one, and does it answer fully the requirements of the case? These questions we can only answer when we know what the hypothesis is—what supposition respecting the origin of the parts is adopted. That of Duval is quite intelligible, and in the case of collateral chorisis seems reasonable, applying well to some of the cases, and supported by some good analogies. In respect to transverse chorisis, it appears to me inconsistent with what is known of vegetable structure and, as Dr. Gray concedes, unsupported by any analogy. But let us inquire what explanation Dr. Gray himself offers and then we can try his hypothesis by the facts. I regret that the Journal of Botany not being within my reach at Toronto, I cannot now recur to the paper to which he refers, but the substance of his own view is that the analogue of the floral parts referred to transverse chorisis is found in the ligule of grasses and the stipules of other plants, he does not think the supposition of axillary organs in the place of buds necessary, although he holds that an axillary bud might be restricted to the development of a single phyton, and thus produce organs in the situation expressed by transverse chorisis. Nothing impossible or antecedently very improbable can be alleged against these suppositions. Some recorded monstrosities even encourage our resort to them, but I cannot perceive either of them to be at all needed in some of the examples appealed to, and it is manifest that neither would afford the smallest assistance in explaining cases of many opposite organs occurring one within another; yet in replying to Dr. Lindley's arguments against chorisis, referring to his forcible appeal to the case of certain varieties of Camellias in which the organs of successive circles become opposite, Dr. Gray says, "Now, when in the very same species, two such different modes of arrangement occur, is it not *a priori* more probable that the two arrangements result from different causes and are governed by essentially different laws?" I think not. The same organs are present in both cases, and either a dimunition or a small increase in the spiral tendency of growth would change the usual alternation into the occasional oppositeness without any thing occurring at all inconsistent with known facts; but if Dr. Gray would receive the opposite petals of these Camellias as an example of transverse chorisis, it is at least one which his own mode of explanation could not possibly reach, and which on any principle yet proposed, must appear most extraordinary. Let us now consider a few examples of transverse chorisis by which we may judge whether there is any need for the name or for any new principle applicable to these cases. "A common case," seys Dr. Gray (Bot. Text Book, 4th ed. p. 253) "is that of the *crown* or small and mostly two-lobed appendage on the inside of the blade of the petals of Silene and of many other Caryophyllaceous plants. This is more like a case of real *dédoublement* or *unlining,* a partial separation of an inner lamella from the outer, and perhaps may be so viewed." But the close relation of the petal to the stamen, and the many instances of a condition intermediate between the two are well known, and it seems easy and natural enough to regard the crown as an imperfect development of anthers whilst the expansion above it corresponds with the petal-like enlargement of the connective in some stamens, and the claw with the filament. Here then, we need no new principle, and find no real exception to recognised laws. The appendage to the stamen in Larrea and other Zygophyllaceae is perhaps as good a case as can be found for the application of the stipule theory which has here not a little plausibility, although when we consider the modifications of development in a single petaloid organ as shown in Ranunculus with its petal scales, Helleborus with its nectariferous cup ; some species of Lilium with their protrusions on the surface, and again the cases among the grasses of awns which are the midribs of the glumes or paleæ to which they belong, departing at some distance below the apex, we, perhaps, ought not to consider the appearances as inconsistent with the supposition of one organ developed in an unusual manner. Perhaps the appendages at the base of the anther in Erica are quite as strange as if they occurred at the base of the filament, and the stamen growing from the extremity of a petaloid process in Campanula not much less anomalous than if it rose from the same lower down, or at the base. Then we have the stamen of Asclepias with its extraordinary appendages which is as like the unlining of an organ as anything we are acquainted with, yet undoubtedly is no more than a mode of development of the one modified leaf.

The next example is taken from the genus Parnassia with its curious and beautiful appendages [nectaries of Linnæus] opposite to the petals immediately within them, and thence inferred to be derived from them, or, as it were, a part of the same organ. These appendages may be some justification of collateral chorisis though the multiplication of parts is incomplete, but I confess I can find no reason for denying them to be a circle of parts originating distinctly in the torus, although they are placed opposite to the exterior circle. I have given reasons for believing that oppositeness alone is no argument for identity of origin in organs, and if it were, the fertile circle of stamens in Pamassia must be accounted only a transverse chorisis of the carpels, as the members of these two circles are also opposed to each other. The case of the group of stamens with the petaloid scales behind it in the American Linden seems very closely to resemble that of the clusters of stamens, in that instance coherent, of Malvaceae in a half-double flower; of the latter we have the separate petals partially developed as clusters of stamens, and we observe that they are not flat or merely curved, but nearly funnel shaped or folded round again. Let a small portion assume the leaf-like aspect and the rest subdivide into separated stamens and we have a remarkable instance of collateral chorisis in an organ so curved in figure as to produce the very appearance exhibited.

These examples probably include all the varieties that would afford anything special from which to reason, and further details would be unsuitable in this place. I conclude, 1st, that chorisis or the division of a single organ into two or more similar, or approximately similar ones, is a possible and reasonable supposition, and accounts well for a class of facts which the laws of structure previously established did not properly reach. 2nd, that chorisis does not admit of being divided into two kinds, collateral and transverse; that the latter kind as explained by Dunal, to whom we own the theory, is liable to most serious objections, and is not justified by any facts necessarily implying it, or strictly analogous with it; that the explanation adopted by Dr. Gray takes the case entirely out of the formation of separate organs from a single one; and that oppositeness of parts in adjoining circles is no indication of those parts being of common origin or belonging to a single organ, so that transverse chorisis may be entirely set aside. 3dly. That the ingenious and distinguished authors who have proposed and defended the law of chorisis have been led to apply it in various cases which do not really come under the law, and are better explained on other principles, particularly that there is no chorisis in Brassicaceous flowers, and that a number of organs really derived from several distinct circles may be so pressed together as to form one apparent circle, the parts even being connected by a common expansion derived from the torus, so that a number of crowded parts however regularly set is no proof of chorisis.

With these restrictions I receive chorisis as an additional principle in the structure of flowers, affording us valuable assistance in bringing them all, however varied, within general rules, and manifesting their common relations.

ON ERRATA RECEPTA, WRITTEN AND SPOKEN.

BY THE REV. DR. SCADDING,
LIBRARIAN TO THE CANADIAN INSTITUTE.

(Continued from Vol. X. p. 232.)

IV. VERNACULARISMS.

All that a man of one language can do, when foreign words and phrases fall upon his ear, is to extract from them such a meaning as he best can, according to the principles of his own solitary vernacular. The English sailor deduces strange meanings from the sayings of the Dutch and Chinese; and the Dutch and Chinese probably interpret, in a manner equally odd, the words of their eccentric British friend. The Chinese indeed, we know, have made out of our English tongue a dialect of their own, which is now even adopted by those who trade with them. At Hong-Kong and Canton grave British merchants, in conversation with Chinese, seem suddenly to fall into a premature second childhood, and to indulge in the infantile babble of the nursery.

In all ages a certain amount of intercourse, somewhat like this, must have been carried on between different races and tribes; and it can easily be seen how a complete misunderstanding on both sides may in some instances have arisen; and how singular blunders may have been transferred from one tongue to another, and at length incorporated in the languages of nations as vernacular expressions authorized by custom, however wrong in their first use.

Traces of such international misconceptions are observable in numerous common terms, but especially, as was to be anticipated, in the names of peoples and tribes, of countries, cities and particular localities, of kings and distinguished personages, as handed down to us by annalists and historians.

Sometimes names that have a real significance become, when vernacularized in another language, simply conventional; while, on the other hand, names that seem conventional, or the etymology of which is not perceived, assume a meaning quite foreign to their actual import. Sometimes, again, when a meaning cannot be forced into the whole name, a syllable of it is made to give out a vernacular sound;

and sometimes a term is only simplified by clearing it of harsh consonants or modifying it according to philological law.

The Alemanni, rendered familiar to us by Tacitus, have given in French and Italian a name to a large portion of central Europe. In French, as we know, Germany is L'Allemagne. In Italian, it is Alamagna, popularized into Lamagna, conveying to the uninstructed ear the idea simply of great size. Alemanni, nevertheless, was no national name, but the sound caught by the Gallic or Roman soldier, when some boastful prisoner from the farther bank of the Rhine asserted, in his hearing, that his people were either all true men, all brave warriors, or else that they were congregated from all parts of the interior. Again: along the Danube, it would be gathered by the men of the legions from Italy, that the banded hordes with whom they came in immediate contact, called themselves *Marcomanni.* This expression is entered on the tablets of the Roman officer as a national or tribal name; although its real significance in the barbarian mouth was "men of the border," "guardians of the march." Their tribal designation would be quite a different thing. The elementary books on English history, in use a few years ago, failed to apprise the student that *Mercia* was the March-land, and the *Mercians* the people of the March, i.e. as between the earlier Saxon settlers and the Celts whom they were displacing. And it is not every one that is to this day aware that "letters of marque" are strictly an authority to harass the enemy beyond the limits of the frontier.

In forming the word *Germani,* the Romans were probably influenced as well by a kind of analogy of sound between it and *Romani,* as also by its welcome identity with a vernacular term of their own signifying "brothers." In this his effort at self-satisfaction, the Latin etymologist was happier than the modern Englishman who barbarously vernacularizes Moslem into Mussulman, and sometimes, with greater cruelty still, pluralizes that into Mussulmen. *Germani,* again, is, in reality, no common national name, but a descriptive term, (*wehr-mann,* warrior, man of war)—formed from the boastful reply of some indignant brave to the questionings of his captors.

According to Tacitus, in his report of the ancient German songs and ballads, the founder of the ancient Teutonic race was *Mannus.* Here again we have a simple Latinization of *Man,* and a curious parallel to the practice of other early and doubtless cognate races, of embodying under a somewhat similar term a type of themselves in their own first condition of society. It is thus that the venerable names have descended to us, of

"Menes and Minos, Numa and Manou."

The *Picts* were generally supposed by the early historians to have had their name from their painted bodies, although it was not explained why they in particular should be so designated when the barbaric fashion to which allusion was supposed to be made, was by no means confined to them. The Picts are now held to have been "pictith," marauders, an epithet conferred on them by their Gaelic neighbours. Their true national name is said to have been *Cruitnich*, Corn-eaters.

The national name of Ireland was vernacularized into Hibernia in Latin, a sound in *Ierne* being caught at by the Roman soldier, as comfortably suggestive of winter-quarters (hiberna).

The Langobards of the north of Europe as well as those who at a later period gave name to Lombardy, have, almost as a matter of course, been described as distinguished for the length of their beards, although in all probability it was the length of their spears, in their own dialect their *barts* (compare *halberts*), that was remarkable. That in rude times names were attached to bodies of men from the fashion of their arms we know; for it was thus that the Ojibway came to speak of the Englishman as *Jaganash*, 'the man with the long knife,' meaning his sword, (unless in this case we have combined an accidental vernacular propriety of sense with an effort to pronounce the difficult word "English.") In a similar manner, *Saxon* is reported (*e. g.*, by Kohlrausch) to be from *sahs*, a short sword.

Like *Alemann*, *Frank* has been transformed into a well-known national name. But Frank, in its first use, denoted simply a tribe retaining its freedom as distinguished from those of its kin who had been subjugated by a stronger power. (Frank is held by some, however, to be interpreted as a derivative of *frak*, the root of *ferox.*)

The name *Saracen*, a stern reality to our ancestors of the crusading times, a term of romance only to us, was no true proper name of a people. It was, by the customary misunderstanding, a collective epithet used as such. It actually means "people of the East," from *Schark*, Arab., "the East." In Latinizing *Scharakajim*, natives of the East, into *Saraceni*, we had a specimen of the simplifying process by which, as in numerous other interesting examples which might be named, oriental words were conveniently adapted to the vocal organs of the western nations. By this process the old Persian *Khshayarsha, vex venerandus,* became *Xerxes.* Other instances are these: *Artaxerxes* from old Persian *Artakhshatra,* (*arta* intensive, and *Khshatra,* king.) *Darius,* old Persian *Daryavush, Dominus,* the possessor. *Darius,* like *Ahasuerus, Pharaoh,* &c., is a title, not a name. *Hystaspes,* old Persian *Vishtaspa,* possessor of horses. *Mardonius,* old Persian *Marduniya,* warrior. *Cambyses,* old Persian *Kabujiya,* eulogist or bard. *Cyrus,* old Persian *Kurush,* the sun. *Astyages, Ajdahak,* the biting snake. *Zoroaster, Zarathrustra,* golden star.—As later instances, add *Sapor* from *Shah Pour, Chosroes* from *Khusru Parvez, Assassin* from *haschischim, Hunni* from *Hiongnu, Hungary* from *Hungri, Ungri, Ugri, Uhori,* nomades, vagrants. *Saladin* is *Salah-ed-Din. Averrhoes* is *Ibn Roshd.* The *Cid* is *El Seid. Prester John* is Prester *Kahn,* the great Khan *Ouang* of the Keraites, who was reported to have been converted to Christianity. In the mediæval period, *Akka* in Palestine was transformed into *Acre*—an instance of an unnecessary vernacularism becoming at length a spirit-stirring, historic word, and the source of several family names.

The Phœnician terms *Petuli,* contention, *Voseveev,* place of flame, and *Evoron,* blindness or darkness, became *Puteoli, Vesuvius* and *Avernus.* The latter by the Greeks of the neighborhood was adroitly interpreted to be *Aornos,* birdless.

The Etrurian *Tarchinia* the Roman wrote *Terracina*; and *Aequiculi,* one of the forms of *Aequi,* the well-remembered associates of the *Volsci,* quickly became *Aequicoli,* practisers of justice. *Orichalcum,* mountain-copper, is *aurichalcum,* gold-bronze; and *Hercle,* in the asseveration *Mehercle,* is understood, not of the native *Herculus* or *Herclus,* guardian of the Pen and Fold, but, of the son of Zeus, Heracles. The general term *Aborigines* (*ab* privative and *origo*) becomes in Festus *Aberrigines,* nomads from all quarters. Lycophron makes out of *Aborigines, Borigoni,* thrusting the word into the Greek compounds in *gonoi.*—*Hyperai,* certain ropes, braces of the yard-arm in the tackling of ships. were understood by the Roman sailor to be *opifera,* the help-bringers. In the dialect of Etruria, Aphrodite was *Fruti,* which became associated with *fruitus;* and the mongrel *hierospex* passed into *aruspex,* perhaps under the influence of *ara.* The received interpretation of *Rome* itself by the word of good omen, *Strength,* is now held to be a vernacularism,—a Latin Græcism, so to speak, for *Groma* or *Gruma*, the military surveyor's staff set up to mark the centre of a proposed camp.—*Postumus*, a superlative of *posterus*, was sometimes, as in English, converted into *posthumus*, as though it expressed relation to one defunct and buried in the earth; while, in fact, it is simply 'last;' indicating, when applied to offspring, that the child is the latest born; including, especially, the case of an infant born after its father's death, or after he had made his will.—In one particular sense, *providentia* acquired the form *provincia*, with the notion included, that a *province* was an addition to an empire, by conquest.—So *duellum*, the archaic form of *bellum*, as *duis* for *bis*, was interpreted, in the time of Festus, 3rd century, A. D., as if *duo* were contained in it; and, as if it expressed, simply, what the English word *duel* does.—And, *opus Musivum* or *opus Museum*, "work inspired by the Muses," i. e., displaying taste and beauty, has come down to our time in the Italian *musaico*, and the French *Mosaïque*. In this last term, we see a blending of ideas, similar to that which, at a later period, confounded occasionally *sabaoth* with *sabbath*.—The *Fasti* of Ovid would furnish a multitude of ill-founded Latin vernacularisms were it expedient to cite more than those that are here referred to.

The infamous Emperor Elagabalus, more correctly Avitus Bassianus, or (to employ the respectable name so horribly abused by him) Marcus Aurelius Antoninus, figures in Greek writers (e. g. Heliodorus), as *Heliogabalus*, wherein the *Helio* is a vernacular effort to express the whole sense of *Elagabalus*, a name of the sun-god worshipped at Emesa; a name, however, having no reference to *Helios*, but to *Elah-Gebal*, an aerolite preserved and venerated as a fetiche in a temple of that city.—The Hebrew *Kishon*, literally "bent," the "ancient river" now known as the Nahr Mukutta, becomes in manuscripts by Greek hands the river *Kisson*, the Ivy-river. In the same manuscripts the brook *Kidron*, literally "the dark," is the brook *Cedron*, the brook of Cedars. In a similar manner, Simon of Cana, Simon Zelotes, figures sometimes as Simon the Canaanite, Canaanite being the more familiar term.—Bozra, the ancient site of Carthage signified in Phœnician, *town*. The Greeks chose to understand the word in their own way, and to call it *Byrsa*. Then followed a story to account for the name. One of the summits of the Capitoline Hill in Rome is covered at this day with the buildings of a Church and monastery bearing the title of the *Ara Celi*. We have here an ancient

Latin vernacularism originating in *Arce*, i.e. the *Arx* or citadel which once stood on the same spot.—The Capitoline Hill itself is popularly known as the Campidolio, the oil-field. Finally the famous Amphitheatre of Vespasian, commonly spoken of as the Coliseum, was, at least in the middle ages, designated the *Colosseum*, the place of the Colossus, the former site, that is, of the Colossal statue of Nero.

It was not my intention when I began this paper to dwell at any length on such vernacularisms as those which I have just been noticing—vernacularisms to be detected in tongues now little known or passed entirely out of use. I desired to discuss principally a few verbal curiosities of the kind indicated, which I have happened to observe in our own common speech and in one or two cotemporary foreign languages. To them I now proceed.

1. And, first, let us take some names of plants or vegetable productions. It will not be necessary to make any remarks upon ordinarily-quoted and very obvious examples. I therefore dismiss at once *rosemary* from *ros marinus*, *tuberose* from *polyanthes tuberosa*, *foxglove* from *folks*', i. e. fairies', *glove*, *liquorice* from *glykyriza*, *mandrake* from *mandragora*, *dandelion* from *dent de leon*, *hollyoak* (according to Lord Bacon) from the Anglo-Saxon *holihoc*, *buckwheat* from *buche-wheat*, i. e. beech-nut wheat, grain of a beech-nut shape, &c. In respect of *mandrakes*—there is, in "Sir John Oldcastle," a play sometimes attributed to Shakspeare, an allusion to a popular notion about them. The guilt of murder, it is there said,

> ——— solicits Heaven
> With more than mandrakes' shrieks.

From *mandragora* has sprung the elaborate French vernacularism, *main de gloire*. I pass on to specimens of less notoriety.

When we enunciate the names of the well-known common flowers jonquil, gilliflower, daffodil, periwinkle, or of the herbs parsley, carraway, the weed purslaine, or the familiar exudation from our pine-trees, turpentine, we feel at once that, if they do not in every instance convey a perfect English meaning, they are at least made up of plain English-sounding syllables, each possessing a certain degree of sense. These are all vernacularisms based on terms foreign to our speech.

Jonquil is properly the Italian *giunchilia*, i. e. the *narcissus juncifolius*. Gilliflower is, through the old French, *gilofré*, for *girofle*, the botanical *caryophyllus*, a clove. Daffodil is a capricious Anglicisation of *asphodel*. Periwinkle is Italian again, viz. *pervinca*. Parsley is *petro-seli-num,* rock-apium, rock-bee-plant of Selinus. Carraway, also care-away, is the *Carum carui,* or *Sem. Car. carui* of the druggists' drawers; in Arabic *karawaia.* Purslaine is *porcellana,* Italian once more. Turpentine is *terebinthine,* properly the gum of the *pistacia terebinthus.* To these add the *service-tree,* which is intended for *sorbus-tree,* now classed as a species of *pyrus* (*p. torminalis*), but placed by Linnæus, along with the mountain-ash and rowan-tree, in a genus *sorbus*:—also the *Judas-tree,* which means *arbre de Judée,* tree of Judea. (The Latin translation of Bacon's Essays, art. Gardens, has for "gilliflowers" *cariophyllatæ.*) A rich Malaga wine, taking its name from the brand of one Pedro Ximenes, is commonly Anglicised into *Peter-sa-mee-ne;* which our sailors take a further liberty with and call *Peter-see-me.*

Again: *nutmeg* is the Old French *noix muguette,* in modern French *noix muscade.* (*Muguette* was previously *musquette,* from *muscus,* sweet, whence also *musk.*)—A powder used in the manufacture of dyes is vulgarly called *cudbear.* Its real form is *Cuthbert,* the name, perhaps, of the first "patentee."—*Eagle-wood,* an ingredient in the composition of incense, is from *agila,* a Malayan word having nothing ornithological in it, and *aod,* a syllable from the Arabic.—The *lign-aloes* or *aloes-wood* of the druggists and cabinet-makers, is not a product of the aloe, but the fibre of the *agallochum,* to which term corrupted the first expression is due.—A corrupt pronunciation of *ambergris,* grey amber, is common. The fine Persian word *lilac* likewise suffers, in vulgar English, Anglicisation in both its syllables, *li* becoming *lay,* and *lac, lock.*

Quinine (in the mouths of the uneducated sometimes *Queen Ann*) is *kin-kina* (whence *cinchona*), i. e. the native Peruvian name *kina-kina;* and *percha* is properly *pertsha,* Malayan for the tree which yields the *gutta* or gum.

The *fleur de lis* or *lys* of France used some years ago to be *flower de luce,* or even *Lewis,* in English, from supposed allusion in the words to *Louis,* the name of so many of the Kings of France. (*Lis* is properly *lils,* and this from *lilium.* Thus in Shakspeare—

> ———"Lilies of all kinds,
> "The flower de luce being one."

Louis is *Clovis,* which is a modification of *Chlotwig,* people's defence.)

2. Next let us notice the names of some of our fruits. The Persian for *orange* is stated in the vocabularies to be *narenz;* and the

Arabic *narang*. In the Latin of the 13th century this last is represented by *arangia*. Merchants and others speedily satisfied their common sense that this *arangia* might with greater propriety be *orangia*, a word conveying, by the sound of its first syllable at all events, the idea of a golden-coloured object.—In passing down the Rhone the traveller is interested in beholding, stretched along its left bank, the ancient city of Orange, the place from which the Counts of Nassau, early in the 16th century, by virtue of alliances by marriage, added to themselves the title of Counts of Orange. But here, in this local Orange, the vernacularizing process has taken effect, not upon the Persian or Arabic name of a fruit, but upon the Latinized name of an old Celtic city, Arausio. Out of the coalescence of these two separate vernacularisms into one has arisen the name of a third thing, viz., of a colour destined to hand on to the present day and to far continents a specimen of the power over the unreasoning many, of association in relation to the hue of a riband or a flag; a study by the aid of which, as by that of some minute fossil of a by-gone era, we can the more easily realize the proceedings of the factions of the Hippodrome and the feudal strifes within the mediæval cities. The modernized local name of Orange on the Rhone had, very probably, its weight with the French traders in the Levant when they converted the Arabic *narang* into a word of more vernacular sound.—The *aurea mala* of the Hesperides are now interpreted to have been simply oranges, which, when very rare, were regarded as rather mysterious curiosities, just as the eggs of Ostriches used to be. In the time of Friar Jordanus (circa 1330), the orange was not known in Southern Europe. He describes those he saw in India as "lemons sweet as sugar." (Vide his *Mirabilia*, p. 15.)

A species of pear is familiarly known among us as the *bon-crêtien*, "the good Christian;" a singular name for a fruit. It is a French vernacularism for the Greek word *panchresta*. The *poire panchresta* means "the unexceptionable, every-way excellent pear."—Again, the apple called the *rennet* bears in reality also a French name; but we have compelled it to sound English. It is properly *rainette*, "the apple mottled like a frog."—The *genneting*, or as Lord Bacon gives it, the *geniting*, is a departure from either *June-eating* or *St. Jean-eating;* if it be not, as has been suggested, the Scottish family name *Janeton*.—A fruit not much heard of among us is the *medlar;* but its name is not unfamiliar, through a proverbial reference to the fact that it is only then fit to eat when it is in a state of decomposition.

This word we have vernacularized from *meslier*, a French transformation of *mespilus* or *mespilum*, the classic name of the same fruit.—*Berberis*, the botanical Latin for a well-known ornamental and useful shrub growing in abundance wild on the New England coasts, we have adroitly made *barberry*, catching at the sound of the last two syllables. The original of the term corresponds to the Arabic name of the shrub.—The Anglo-Indian *jack-fruit* is an obvious modification of the native *tsjaka* and *iaca.*

8. The appellations of animals, of fish and of birds, of insects and various creeping things, furnish instances of vernacularized terms. I take first the case of the *Muscovy duck.* Muscovy knows little of him. His home is Nicaragua. He has his name from a tribe of Mexican Indians, the *Muyscas.* He was at first known as the *muysca,* then as the *musco* duck. Finally, Muscovy being a name more familiar than either of the other two to the British ear, he became the *Muscovy duck.*—Again: the syllable *prey* in *osprey* has a good predatory sound. The Latin name of the creature is literally the *bone-crusher, ossifraga.* The French have vernacularized it into *orfraie;* we, into the word of the satisfactory seeming just mentioned. To our unsophisticated forefathers, *caterpillar* very probably appeared a well-selected appellation. It hinted of insects somewhat cat-like, whose habit was to "pill" and lay waste. But the element *-pil-* has reference to the *hairiness* of caterpillars. In the Italian of Lombardy the silkworm is *gatta* and *gattola,* "little cat." (*Chenille,* the French for caterpillar, is "little dog," *canicula.*) In Spanish it is *fel-pilla, felis pilosa,* good Latin corrupted. In Norman French this became *chatte-pelouse,* which we vernacularize into "caterpillar."—In the first instance, we see, it meant the silk-worm only. In connection with "cat," I may mention that in the Walloon, i. e. the Flemish spoken between the Scheldt and the Lys, the name of this animal is said to be *pisice,* which may originate what Archbishop Whately called the English irregular vocative of "cat."—In the same connexion I add that *scate,* the name of a not unfamiliar fish, is properly "sea-cat" pronounced short. Its Welsh name is *morgath,* which is, to the letter, "sea-cat."

The monastic annalists had alarming ideas about *cockatrices.* In heraldic zoology these beings still exist. It appears that *crocodiles* were meant. The Low-Latin word was *culcatrices,* whence came the Italian *culcatrice,* the French *cocatrix,* and the English *cockatrice.* The emblasoners of arms, carried away by a vernacular sound, figured the animal accordingly. Friar Jordanus reports that in India the Less, i. e. the neighbourhood of the Indus, "there be also coquodriles which are vulgarly called calcatrix; some of them be so big that they be bigger than the biggest horse. These animals be like lizards, and have a tail stretched over all, like unto a lizard's; and have a head like unto a swine's, and rows of teeth so powerful and horrible that no animal can escape their force, particularly in the water." (*Mirabilia*, p. 19.)—*Apropos* of lizards,—*alligator* for *al-ligarto*, THE lizard *par excellence*, is well-known. *Lizard-point*, on the Cornish coast, is said to be from *liz=cape*, and *ard=high*. In like manner, dormouse for *dormeuse* (*la souris dormeuse*), John Dory for *jaune dorée*, belfry for *befroi*, bellwether for *bélier*, i. e. *vellarius*, are vernacularisms too familiar to detain us here.—The name of the *hawk* (Lat. *accipiter*) has been curiously vernacularized in Italian into *astore*, which in the popular mind is supposed to imply that it is "the bird of Asturia." In Spanish and Portuguese it has become *azor*, whence the name of the *Azores*.—The *shual* (rendered "fox" in the English translation of the Hebrew Scriptures) has become a household word under the vernacularism *jackall*. We can easily see what was the transition-term to this very English-sounding word. It was, no doubt, the *ciacales* of Busbequius. He thus describes them:—"Lupi sunt, vulpibus majores, communibus lupis minores; voracitate tamen edendique ingluvie pares: gregatim incedunt; hominibus armentisque innoxii, furto magis et dolo, quam vi, victum quærentes: ab harum ferarum ingenio Turcæ, homines fraudulentos et versipelles, maxime Asiaticos, *ciacales* vocant." (P. 78, ed. Elzevir, 1660.)

A familiar, and even proverbial, word with our grandfathers was *popinjay*. This is *babagâ*, the Arabic for "parrot." The Mediæval Greeks made out of it *papagas*, and the French *papagai*. We, after our English manner, turned it into *popinjay*. The modern Greek is *papagallos*, with the notion implied that the bird so designated is a favourite pet with priests (*papas*). Hence the name is, *quasi* "the abbé's delight."—The gay costumes of mingled orange and scarlet, distinguishing the Swiss guards who lounge in the porticos of the Vatican, are strangely suggestive of this bird and its plumage. Many an Italian Hotspur has possibly found "popinjay" rising to his lips, as he eyed them.

4. Take, next, examples of vernacularisms in implements, fabrics, household stuff, &c.

Carpenters have a tool which they call the rabbet-plane. Its name has come from *rabot*, the French word for a plane. *To plane* is *raboter*. It describes the action of the arm while the operation is going on. It is the Italian *ributtare*, to thrust against or back, affected by *rabattre*. (*To rebut* is to thrust back.) There is a machine for giving a gloss by pressure, called a *calender;* in French, *calandre*. It gave to Gilpin's benevolent friend in Cowper's ballad, a title which sometimes puzzles young readers. "Cylinder" was a term too scientific for the artisans of a former day. It accordingly took on a sound more familiar. In French, "calandre" is identical with the name of a kind of plover.—In like manner the peculiarly-formed compasses used to measure "calibres" have become, in the popular dialect, *callipers*. (In "calibre" verbal numismatists detect "æquilibrium.")—*Andiron*, for the now almost extinct *fire-dog*, is a singular-looking word. It is the Old French *andier*, of which the Late-Latin was *andena*, one signification of which is a "rack for the spit." Some persons please themselves by imagining that *andiron* is *end-iron* and even *hand-iron*.—The French themselves have vernacularized the word into *landier*, by incorporating the article, as they have done also in *loriot*, *lierre*, *lendemain*, *lévier*, and possibly other cases.—When we remember the semi-transparent material formerly used in the construction of lanterns, it is not to be wondered at that the name of this "useful light" developed itself into *lanthorn*. (*Lanterna* is *laterna*, akin in root to the Germ. *lauter*, bright.)—*Damaghan*, in Khorassan, once famous for glass-ware, has been vernacularized by us into *demijohn*. The French convert it, or something else, into *dame jeanne*, a name tending to shew that our ancestors, while saluting their tall cans as *jacks*, were not so peculiar in styling lesser vessels *gills*, Gill being, as we know, short for Gilian, i. e. Juliana.—*Coverlid* and *coverlet* are both the French *couvre-lit*. *Côtelette*, "little side," we ingeniously naturalize into *cutlet*.—*Counterpane* expresses the notion of symmetrically-arranged squares. It is the French *contre-pointe*, *courte-pointe*, and *coulte-pointe*, vernacular graspings, all three, at the Latin *culcita puncta*, a soft *quilt*-ed appliance to be spread upon a couch.—Out of *hamac*, the native term for what *we* call a *hammock*, the Dutch have contrived the descriptive vernacularism *hang-matte*.

If not "from China to Peru," at least from Ireland to Cashmere' local names have given us vernacularisms for fabrics of the loom and other material. Thus, while the last-named region has given *us*, *kerseymere*, and the French, *casimir*, *drugget* is said to be due to *Drogheda*. Intermediate points have done similar service. For example, *Cyprus* is the source of the old word *cypres* or *cipresse*, for *crape* (Fr. *crespe*).

> "Come away, come away, Death,
> And in sad cypres let me be laid."
>
> —*Shakspeare.*
>
> "Flowing, with majestic train,
> And sable stole of cypres lawn."
>
> —*Milt. Il Penseroso.*

The word has been transformed by modern editors into the less dubious shapes *cypress* and *cyprus*.—*Canopus*, the luxurious city of the Nile, has probably affected the orthography of "canopy." It ought, according to its etymology, to be "conopy," from *cōnōps*, a mosquito. A canopy is, in the first instance, a bed provided with a mosquito-net.

From the French *moire, lustre, ruban*, we have invented *mohair*, *lutestring*, *riband* and *ribbon*. Even the *buff*-jerkin of our forefathers was a vernacularism from the French, and had reference to the animal out of whose hide it was made; the consumption of whose fibre is supposed to contribute so largely to the national energy.

Galoshes, vulgarly sometimes *gallo-shoes*, are, through the French, the Late-Latin *calopedia*, a vernacularism for the Greek *kalopodia*, i. e. sabots or clogs, literally "shoes made of wood" (*kālon*=wood); thus, *calopedia, calop'dia, galoche*. Some deduce the word from *Gallica, solea* being understood. If this did not suffice, a suggestion might be offered of *calĭga*, "the boot of the private soldier," from which Caius Cæsar Caligula had his military sobriquet.

"Spectacles," for "glasses," is the French "besicles" vernacularized; and "besicles" is a popular derivative of *bis-cyclus*, a term having reference to the large circular lenses (*lunettes*, "little moons,") formerly used.—In association with this word, note that "Cyclops" is a Hellenic vernacularism. The *Cycl-* is now declared to have nothing to do with *cyclus*, but to be rather the old word *cocles*, i. e., "blind." (Vide *New Cratylus*, p. 254.)—"Spectacles" in French are also *binocles*, i. e., "binoculars," somewhat rubbed. This fine scientific term has given rise in English to the vulgarism "barnacles."

5. We come now to vernacularized names, technical and other terms.

The individual and family names which have undergone vernacularization are innumerable, as may be seen at large in the "Teutonic Name System" of Mr. Ferguson. Names of places are also often thus transformed.

Bombay is *Bona Bahia*, Spanish, from *baja*, a bay. (Compare Bahia, Bayonne, Bay State.) *Groyn* and *Leghorn* are the English sailor's rendering of the *Corunna* and *Livorno*. He makes, in a similar manner, *Irish islands* and *Sick-ladies* out of *Hyeres-islands* and *Cyclădes*. "The Gulf of Lyons" figures on our maps, as though there were some reference in the phrase to the city of Lyons, which in French is *Lyon*. But on the French maps it is "Golf de Lion," Lion-gulf; reminding us of *Bocca Tigris*, *Bab-el-Mandeb*, ("Gate of Tears,") and other names of evil sound. The "wild and stormy steep" which a Dane would call *Helsingors*, we (or rather our fathers before the time of Shakspeare, thinking probably of their own native *Nore*,) have familiarized to our English ears as *Elsi-nore*. —Into *Tartary*, "the country of the Tatars," the *r* has crept, from a monkish association of the native word with *Tartarus*. Such writers as Friar Jordanus instilled the belief that inland desert tracts generally were peopled with demons.—In *Guadalquiver*, *Wady-al-Kebir* is forgotten. To *Cannibal*, simply a *Carib*, or inhabitant of the Antilles, we have assigned an exclusively anthropophagous sense. —*Brennen*, a mountain in the Tyrol, is a vernacularization of *Pyren*, *Pyrn*, "high mountain," the Celtic root of Pyrenees as well. The *Danejohn* of the city of Canterbury is "the promenade of the *donjon*" or old castle-keep. *Rotton Row* in London is said to be *route au roi*, "king's road."—Built on the site of a *brasinium*, appertaining to an ancient academic Hall, the mysterious *Brazen-nose* of Oxford proves to be a vernacularism for *brasen-huis*, a *braserie*, or brew-house.—At Arles, in Southern France, is a cemetery commonly known as the *Arlecamp*, and popularly understood to express its relation, as God's acre, to Arles. It was anciently, however, written *Elycamp*, whereby its first designation, viz., *Champs Elysées*, is betrayed.—Our English term *Carfax*, to be met with in Oxford and Exeter, is properly *quatre-voies*, "a place where four ways meet." On the same principle is to be interpreted the proper name *Bifax;* but *Fairfax* means *Light-haired*, and *Colfax*, *Hazel-haired*. In *débonnaire*, i. e. *de bonne aire*, as well as in the phrase *de gentil aire*, the *aire* is a descendant of *arvum*, equivalent to *ager*, in the sense of "landed property." Through the tendency to get at a sense perforce, "St. Peter's eye," i. e. island, on the Thames, has become world-wide renowned as "Battersea." The same tendency here in Toronto turns our "Bathurst-street" (vulgarly and even in a printed advertisement,) into "Batters street."—The river Rapidan, famous in the late United-States troubles, sounding as if it contained *-dăn-*, the element noticeable in *Eri-dan-us, Dan-ube, Don,* and other river-names, is nothing more than *Rapid Ann,* a name commemorative of the good English queen.

Our own *Anticosti* is a French vernacularized form of the aboriginal name, *Nantiscotec*. *Ha-ha bay,* perhaps, expresses surprise; like the term, *ha-ha hedge.* It is a singular sinus, or side-loop of the River Saguenay; which, at a first visit, might easily be taken for the main stream. (The native name is given, but without interpretation, as *Hesknewaska*. That of the Saguenay, also, *Pitchitanichetz*.) In the French maps it is marked *Baye des Ha.*

A curious vernacularism, in regard to an English proper name, may here be mentioned, although already well-known. It occurs on a monument in the Cathedral of Florence, placed there in honour of an Englishman eulogized under the name of Acutus. It commemorates, however, no member of the numerous family of Sharps, as at first sight would be imagined; but, Sir John *Hawkwood,* a valiant condottiere of the 14th century. "Hawkwood" presenting difficulties to the Italian organs, it was conveniently vernacularized into a good native sound, conveying a good native sense—*Acut-o*; and so, incised on marble, it has descended to posterity. In like manner, the name of Sir John Hawkins, a naval hero in the time of Elizabeth, better satisfied the Spaniards when they had reduced it to the Hellenic-looking *Achines*. *Vide* Froude's "Reign of Elizabeth," where (p. 107) see, also, the remarkable expression, "the queen-dolphin's title," used of Mary of Scotland, as (up to the death of her father-in-law, Henry II.) dauphiness of France. *Dauphin,* in the French language, was a term so conventional that it startles us to see it in plain English. Like the names borne by our heraldic pursuivants, *rouge-croix, rouge-dragon, port-cullis,* &c., and somewhat like the mythic "Pen-dragon" of the era of Arthur, *dauphin* was a name accruing from a cognisance or crest, borne first by the Counts of Vienne; and then, after the transfer of their rights to the Kings of France (1343), by the immediate heir to the French throne. There are authorities who contend that the title, *major domûs,* in the courts of the Merovingian Kings, is a Latin vernacularism for the native *mord-dom,* 'judge in capital cases.' The historic 'Charlemagne,' itself, is declared, by the same investigators, to be a disguised form of the Teutonic *Karl-mann,* 'strong man.' Such readings of received terms meet with little favour. and *lamas ubhal,* according to Foster's *Perennial Calendar,* an old Saxon term, equivalent to *le messe des pommes,* i.e. *le Toussaint,* All Saints' day, November 1, became *lambs' wool* in later times, a beverage used on the festival, concocted of bruised apples, ale, wine, &c., was once 'the carles' wain,' the wagon of the churl, or husband-man. Without doubt, however, 'Charles' wain,' the group of stars so-called; Adopting a course the reverse of that supposed in the cases of *mord-dom* and *Karl-mann,* our Netherlandish kinsmen have constructed a vernacularism out of an undoubted Latin title. They have transformed *comes stabuli,* 'the count of the stable,' the original of 'constable,' into the Dutch *coninc stavel, fulcrum regis,* 'king's support.' Once more: from a Celtic word, *bach*=small, the Late-Latin adjective, *bacalarius,* was formed, expressive of the condition of a minor —of one not yet advanced to the dignity of master in an art or science. An ingenious vernacularizer improved this into a word blending the ideas of the ivy-berry and the bay—*baccalaureus.* Like Dom Diniz, at Coimbra :—

> "Here, ivy-wreaths, with gold, he interweaves,
> And the coy Daphne's never-fading leaves."
>
> —*Lusiad,* 3, 75.

Hence has arisen 'bachelor,' in all its senses. As to its application, in the technical language of chivalry, that has been vainly assigned to the French *bas chevalier.*

Some further French vernacularisms, for which I have not hitherto found a place, together with a few similar or connected misunderstandings in English, may here be subjoined. *Boulevard* is now almost English. It is the French transformation of the Low German *bolwerke,* a bastion, or a portion of the fortifications jutting out in a circular form. We make *bulwark* and *bulwork* out of it. 'Boulevards,' in the Parisian sense, are now remarkable for the absence of that from which the word has descended. They are the open spaces left by the removal of the ancient city-walls.—The common impression is that *faubourg* is the *fauxbourg,* the quasi-city, the parts arrived at before entering within the walls. The sense of the word is this; but, reached by another route: *faubourg* is, more correctly, *for-bourg*, that portion of the city which is *foris*, 'outside the gates.' Another, and plausible explanation, is the German *vor-burg*, the *ante-urbium*; or, *sub urbium*, the *suburb*, as we speak.

Our *causeway* (more accurately but sounding less correctly, *causey*,) we take from the French *chaussé*, which is a modification of the Italian *calzata*, i. e. in Late Latin *via calceata*, a paved way made firm and solid by means of *calx*, lime or grouting.—The English word "ball," for the French *bal*, has, in the opinion of some philologists, accidentally reverted to its original root. *Bal* is the Italian *ballo*, which is from the Late-Latin *ballare*, connected with the Greek *ballein*, the reference being in the first instance to the movements in playing the game of "ball." There is included in the term the idea of a musical accompaniment, instrumental or vocal: whence *ballad* as well as *ballet*. Strictly speaking, "bal" thus corresponds to the Latin *saltatio* and the Greek *orchesis*, exercises gymnastic and mimetic, accompanied by expressive music, and having very little in common with the modern amusement of dancing.—Our sailors conveniently interpret as "hurrycane" the French *ouragan*, which is said to be a Carib word naturalized. This Anglicism, in combination with photograph, &c., has suggested to a United-States' writer the title "Hurrygraphs," for a work written, it is to be supposed, in haste.—*Maoseen*, Malayan for "year" or "season," which is probably the Arabic *mousim*, "periodical," has been converted by us into the familiar-sounding syllables *mon-soon*, further vernacularized, by Rushworth (1640), into *man-sounds*.—We have Anglicized into *shagreen* the Venetian *sagrin*, the name applied to the rough skin of the *shark*, used for purposes of friction and abrasion, itself derived from the Turkish *sagri*, applied to other substances similarly employed. As *tribulus*, "the teasel," has contributed to the Latin, *tribulatio*, so a material of rasp-like surface has introduced (since the 13th century) into the French, and even into English, the expressive "chagrin."

A burlesque French term for what we should call a "jumble" is *brouillamini*.

> "Il y a la-dedans bien du brouillamini."
>
> —*Moliere.*

It is a vernacularized word with a Latin verbal termination, having its origin in *boli Armenii*, "boluses of Armenia," "boluses compounded of a multiplicity of ingredients,"—a cant expression for the thing indicated by *brouillamini* itself.—Again: in French the *palate* is *palais,* literally *palace.* Here is a confusion between *palatum* and *palatium. Palatum* is *palate,* with the secondary sense of "vault," from the form of the *roof* of the mouth. In this secondary sense *palatum* is applied to the *koilon,* the *cœl*-estial vault, and is played upon by Cicero: "Epicurus, dum palato quid sit optimum judicat, cœli palatum (ut ait Ennius) non suspexit." *De Nat. Deor.* 2, 18.—Ennius lived B. C. 237. *Palatium* for *palace,* i. e. "imperial residence of the Palatine," is said not to have been in use until after the time of Augustus.—One more mongrel French term, having its origin in Latin, is *malingres.* We make of it *malingerers,* "men who feign sickness." The expression really is *mal'œgri.*—The residuary French of the long Latin word *codicarium* is *cahier.* It is properly a *codex,* or book consisting of separate leaves, as distinguished from a *volumen,* "a roll of sheets fastened together." *Cahier,* with us, has become *quire,* in the sense of "twenty-four sheets."—*Hoche-pot, hautes coquilles, chair cuite, potée, foire, sursault,* we render by vernacularisms too commonplace to mention. And has not *partir* something to do with the signal-flag *blue-peter,* hoisted when a vessel is on the point of setting sail? *Pologne* we make Po-*land,* and *amiral* (Arabic *amir-al-bahr,* commandant at sea), *admiral.* Another Arabic designation, *targoman* for *interpreter,* we persist in calling *dragoman,* as though we found him a drawback to pleasure-travel in the East.—*Point-device* is an expression used by Bacon and Shakspeare in a way exclusively English. "Mens' behaviour," the former says in his Essay *Of Ceremonies and Respects,* "should be like their apparel, not too strait or point-device, but free for exercise or motion." The latter puts into the mouth of Malvolio—

"I will be point-de-vise, the very man."

Point-de-vise (so printed in the less recent editions) is understood to be 'precise, finical, over-exact.' *Point de vice,* as the phrase really is, is of course 'faultless,' 'immaculate,' 'absolutely perfect.' It is not easy to see, then, why it should have been explained in Whately's notes to Bacon's essays, p. 549, as denoting "the nicety and precision of a stitch (French *point*) devised or made with the needle."—Certain ecclesiastical addresses or homilies are called in old English *postils.* Being grounded usually on a passage just read, they frequently begin with some such phrase as *post illa,* sc. *verba.* The French have moulded the expression into a word of satisfactory sound to the common ear—*apostille.*—Another ecclesiastical term with us is *parvis,* for a particular portion of a large church. It has been interpreted to mean the place for "the little ones," i. e. the schools. Its real form is *paradis*, i. e. *paradise:* and it denotes properly the *pronaos* or "ante-chapel." The *Parvis* of a church was a place of public resort. In a document, temp. Hen. VIII., quoted in Herbert's *Inns Of Court*, p. 217, a complaint is made in respect of the Middle Temple, that "they (the fellows) have no place to walk in, and talk and confer their learnings, but in the church, which place all the terme times hath in it no more quietnesse than the *pervyse* of *Powles*, by occasion of the confluence and concourse of such as are suters in the law."—*Carillon* is *quadrilio* modified under French influence. It is properly a set of *four* bells. The chime of eight lately put up in Toronto is thus a double *carillon.*—In other ecclesiastical terms, as in "sidesmen," properly "synodsmen," forced interpretations will be found.

The Latin and French of the Law Courts become, of course, in the mouths of the uneducated, sounds of sufficiently strange import, like the cabalistic *sesarara*, for *certiorari*, of Nicholas in the "Puritan," attributed to Shakspeare, and the well-known "O yes." But occasionally the vernacularism becomes written and established, as in "justices in Eyre," i. e. "justices *in itinere*," itinerant Judges (not, however, to be confounded with "cursitor barons"), and "jeoffail" (pronounced *jeffail*), "an oversight in pleading," for *j'ai failli.* Even the old Saxon *Thryddings*, i. e. Thirdings, denoting tripartite division, have been transformed into *Ridings.*—The "*Four* Ridings" of our Canadian county of York indicate, verbally, something that is impossible. At the first organization of the Province of Upper Canada (1798), the County of Lincoln also was divided into *four* Ridings, and the County of York into *two*. Yorkshire in England, whence the term has been (without intelligence) adopted, retains its original subdivision into *three* sections, or thryddings.

A suspicion of "means of living" has crept into "livery." But "livery" in all its senses, legal as well as ordinary, is the French *livrée:* from the Latin *liber-are*. That which we give and deliver over we separate and set free from ourselves.

Among musical instruments, the oriental *sambuca* is vernacularized into *sackbut*, although *sambuca* is a stringed instrument, and *sackbut* is the *trombone*. Out of *hautbois* we make *hautboy*. It is not long since it was *hoboy*. The Italians have turned it into *oboe*, a term we employ as well. In the time of Edward III. the instrument was called a *wayghte.* Our Christmas *waits* retain the name, even though the *thing* be no longer used by them. We mould into *shawm, chalumeaux,* from *calamus,* a reed; whence also *calumet,* and *haulm* (Fr. *chàume*), an old word for straw.

Popular sports and pastimes, especially when introduced from abroad, might be expected to yield a crop of vernacularisms. The technical terms of such amusements are almost sure to be taken, either intentionally or by accident, in a local sense. In the case of Cards the plainest-spoken man who calls a *spade* a *spade,* is wrong. *Spade* is *spada,* Spanish for *sword;* and as swords, "spades" appear on Spanish cards. This suit was intended to represent the military class. In "clubs" we have been inconsistent. We have borrowed the Spanish name *basta,* "club or bludgeon," but have stamped upon the card the object adopted by the French in this regard, merely a trefoil or clover-leaf. This the French call the *trefle.* (What *we* call the "club" the Danes call *klov-er:* has this influenced the term we use?) This suit is to be taken as standing for the agricultural class.—"Hearts" have arisen from an English misapprehension of the French word *chœur,* i. e. choir.—It was imagined to be *cœur.* They represent the *gens de chœur,* the ecclesiastical order. On French cards the figure on this suit is that of a *chalice,* which we modify into a *heart,* following up our verbal vernacularism by a pictorial one.—"Diamonds," little superficial lozenges or rhombs, now, (in French, "quarries," *carreaux,*) are conventional representations of those minute specimens of coloured quartz and other products of crystallization, which men have agreed to estimate so highly; which they find so peculiarly charming to the eye that they designate them, *par excellence,* "delights" (*gaudia, gioja, joya, joye*), intensifying their expressions of affection in regard to them by the use of *diminutives,* and calling them *giojelli, joyels, joyaux,* "jewels."—This suit symbolizes the *merchants,* the great travellers of former days, who brought home from their distant tours rare specimens of the objects referred to. (Our *jew*-el perhaps glances at what was not unfrequently the national descent of the dealers in these fascinating commodities.)—With the Spaniards "diamonds" are *oros,* gold pieces, and "hearts," *copas,* chalices or cups. Other modifications from the Spanish, in Cards, are *ace* for *as, trump* for *triunfo, pool* for *pollo, i. e.* stake, and *ombre* for *hombre, i. e.* "your man." The Spanish *naypes,* for Cards, in Italian *naipi,* is the Arabic *naib, i. e.* representative. *Naype* has nevertheless been attributed to the initials N. P. of one Nicolao Pepin, who had something to do with the introduction or early manufacture of cards.

"Chess" is a vocable quite English in its sound. It has been rendered so by the usual process. It comes to us through the French *échecs*; in old French, *eschacs, eschas, eschies*; in old Spanish, *axedres*; and, modern Spanish, *xadrez, xaque*; modified into *scacco,* in Italian; whence the Late-Latin, *scaccus.*—The Spanish, *axedres,* is an attempt to enunciate the Arabic, *al-shatranj.* The name of the game, in the old Persian of the 6th century of our era, was *chatrang,* a term wholly un-Persian, as we shall presently see. This, in the later language, was vernacularized into *schach-tranj*; with an allusion insinuated to the *schach,* or king. The true origin of *shatrang,* however, was the Sanskrit, *chatur-anga;* the *quatuor-membra;* the four arms of a military land-force: elephants, horses, chariots, foot-soldiers. To these, the Persians added an emperor, with his generalissimo. Here, then, are our English chess-men. But, their respective names have descended to us somewhat disguised, in some instances, by vernacularization.

In the Persian game, the first piece is the *schach;* the second, the *pherz,* or, vizier—the prime-minister and generalissimo. Then follow a set, denominated *phil,* the brigade of *elephants;* then another, *aspen-suar,* the cavalry troop; then another, *ruch* (a misunderstanding of the *rat'h, rot'h,* "armed chariot," of the Hindu), auxiliary *dromedaries*; and last, the *beydal,* a body of *infantry.*

The *schach* continues, duly translated "king." ('Check-mate'= *Schach-mat,* "le roi est mort.") The *pherz* became, in French, under the influence of popular interpretation, *fercié, fierce, fierge, vierge,* virgin—this last passing, finally, into *dame;* abbreviated, of course, from *notre-dame.* With us, the *dame* has been converted into *queen.* The *phil,* in Spanish, by incorporating the Arabic article, is *alfil;* which, in Italian, assumes the forms *alfido* and *alfiere.* The French made it *fil;* then *fou.* In old French, it was *aufin*; whence, under the hands of the Latinists of the day, issued the very respectable *alphinus,* the *alphyn* of Caxton's translation of Jacopo Dacciesole's *Solatium Ludi Scacchorum.* "The alphyns," Caxton there says, *anno* 1474, "ought to be made and formed in manere of juges syttynge in a chayer, with a book open to-fore their eyen." From this description we can see how in England the alphyn came to be styled a *bishop.*—As to *fou*, buffoon, the French descendant of *phil*,—the Abbé Romain (as quoted in *London Society* for December, 1865) thus sharply remarks upon it in his Poem on Chess:

> Au jeu d'échecs tous les peuples ont mis
> Les animaux communs dans leur pays;
> L'Arabe y met le léger dromadaire,
> Et l'Indien l'éléphant; quant à nous,
> Peuple falot, nous y mettons des fous.

The *aspen-suar*, the horseman of the Persians, retains his identity without material alteration. But the original *rot'h*, 'armed chariot,' Persianized, as we have seen, into *ruch*, a dromedary, has suffered vernacularization again; first in Italian, where it became *rocca*, 'rock' in the sense of 'fortress on a rock;' and secondly, rather barbarously, with ourselves, among whom it goes by the name of *rook.*—Finally, the *beydal*, or footsoldier, has reverted, at all events in sound, to a word familiar in the primitive home of Chess, namely, *peon.* In French it is *pieton* and *pion* (in old French *péon*, i. e., the Latin *pedo* as synonymous with *pedes*, footsoldier); and with us, after manipulation in the approved English manner,—*pawn.*

ON SOME MINERALS FROM LAKE SUPERIOR.

BY E. J. CHAPMAN, Ph. D.
PROFESSOR OF MINERALOGY AND GEOLOGY IN UNIVERSITY COLLEGE, TORONTO.

A recent visit to the north-west shore of Lake Superior enabled me to obtain several minerals of much interest, including two or three species previously unrecognized in Canada. Brief descriptions of these latter, with a few observations on some of the other minerals which occur in this region, are offered in the following notes:—

1. *Native Lead.* As a natural product, lead is well-known to be of exceedingly rare occurrence in the simple or metallic state. On this continent—apart from its occurrence in the meteoric iron of Tarapaca, in Chili—it has hitherto been noticed only at one spot, namely: in a galena vein, traversing limestone (of unstated geological age), near Zomelahuacan, in the Province of Vera Cruz, in Central Mexico. The specimen, from the locality now under consideration, was obtained by Mr. McIntyre, of Fort William, at a spot near the celebrated Dog Lake of the Kaministiquia. The lead occurs in this specimen—the only

one, I believe, discovered—in the form of a small string in white semi-opaque quartz. The quartz does not appear to contain the slightest speck of galena, nor any other substance, except a small quantity of specular iron ore ; and the unaltered appearance of the latter is such as to preclude the supposition of the lead having been derived from galena, or other lead compound, by artificial heat. Before coming to my hands, the specimen had been examined by MR. T. W. HERRICK, whose extensive surveys and explorations in this region are so well-known, and by him it was looked upon as metallic lead.* My experiments fully confirm this determination. The lead, when cut, presents the ordinary colour, softness, and ductility of the pure metal. The sp. gr. cannot be properly taken, on account of the very small quantity at command, the larger portion of the lead having been used up before the specimen came into my possession. Tested by the blowpipe, however, the substance melts readily, and volatilizes ; imparting a blue tint to the flame-border, and forming a yellow ring of oxide on the charcoal. The fused globule is perfectly malleable. On the cupel, it becomes entirely oxidized and absorbed, without leaving a trace of silver. The cupel-stain, when cold, is of a clear yellow colour, shewing the absence of copper, nickel, &c. The nitric acid solution yields with reagents the ordinary reactions of lead-oxide. The substance is distinguished from galena by its ductility, and by yielding no sulphur-reaction with carb-soda before the blowpipe. From Bismuth, also, it is distinguished by its perfect malleability, as well as by the blue colour which it imparts to the outer border of the blowpipe flame. As a further test, it may be stated that a small cutting placed in a solution of bismuth in nitric acid, produces a black arborescent precipitate of that metal.

This discovery is interesting, not only from the extreme rarity of *Native Lead,* but from the fact, also, that in the few undoubted European localities in which the metal has been found, the latter is generally accompanied by gold. The quartz in which the Lake Superior specimen occurs, has, curiously enough, the somewhat waxy aspect and other characters, more easily recognised than described, of the gold-bearing quartz of California and other auriferous districts ;

---

* I have been indebted to Mr. Herrick, from time to time, for many interesting specimens of Canadian minerals, obtained during his arduous explorations on the north shores of Lake Huron and Lake Superior; and, I take this opportunity to bear testimony to his good knowledge of minerals generally.

and the geological position of the rock, immediately above that of the Huronian strata, is in a measure identical with the horizon of the gold-bearing rocks from which the auriferous deposits of Eastern Canada have been derived. No gold has hitherto been met with, however, in the sands of the Kaministiquia or other streams of Thunder Bay.

2. *Galena,* PbS.—This well-known mineral, the common ore of lead, occurs at numerous localities on the north shore of Lake Superior. Some especially rich lodes lie in the township of Neebing, on Thunder Bay, and others of even greater promise have been discovered in the district around Black Bay. In most localities of this region, the galena is accompanied by copper pyrites, the latter occasionally predominating. The veinstone is principally quartz, with calc spar, heavy spar, and fluor-spar in subordinate quantities. When crystallized, the galena presents almost invariably the common combination of cube and octahedron. This combination and the simple cube are the only crystals that have come under my observation in these lodes. I have assayed a good many samples for silver, without finding any workable quantity of the latter metal. The highest amount that I have obtained, corresponds, indeed, to no more than 1½ oz. to the ton of reduced lead. This comparative absence of silver appears to be connected with the very general absence of arsenical minerals throughout the district. I am not aware that attention has hitherto been directed to this point; but a comparative study of the classical lead districts of both Europe and this continent will, I think, be found to warrant the conclusion, that, where arsenical ores—such as arsenical pyrites, Fahl-ores, &c.—are generally absent, the galena will not prove to be argentiferous in a paying point of view.

3. *Marcasite,* FeS^2.—The occurrence, in Canada, of Iron Pyrites in its Trimetric or Rhombic condition, has not been hitherto announced. I obtained several well-characterised examples from the walls of a large vein, holding galena and copper pyrites, in lot 25 of the fifth concession of the township of Neebing, a few miles east of the Kaministiquia river; and a remarkably fine specimen from the same locality was kindly presented to me by Mr. McIntyre, of Fort William. The latter specimen may be seen in the Museum of the Toronto University. In all of these examples, tabular prismatic crystals are united somewhat irregularly, but with the basal plane in common, in curved rows, with an acute angle of the prism projecting outwards, and thus forming the variety known as "Cockscomb Pyrites,"

the "Kammkies" of German authors. In this variety, the crystals are not united regularly by a plane of the prism, or by one of the macrodome planes, as in the true twins of Marcasite, but are simply formed at the free end of the radiating lamellæ, the broad surface of the latter representing the basal plane. A point of much interest, in connexion with these specimens, is the occurrence of common or cubical pyrites *in the same vein.* The latter species occurs in different parts of this vein, in small but distinct crystals—combinations of the cube and octahedron, with the cube faces predominating. Where representatives of the separate conditions of a dimorphous substance thus occur together, the cause by which the dimorphism was produced is not readily explained. In the present instance there were no data to shew that one condition had originated at an earlier or later period than the other, and yet such must in all probability have been the case.

Some of the marcasite specimens from this spot had already entered into decomposition when first obtained—the products being an efflorescence of sulphur in one instance, and, in others, the formation of sulphate. The latter was also in itself altered, by the partial conversion of the FeO into Fe^2O^3, its solution yielding an abundant blue precipitate with ferrocyanide of potassium ("yellow prussiate.")

4. *Molybdenite,* MoS^2. Several veins of quartz, in which this mineral is abundantly distributed, occur on the shore of Sea-beach Bay, near Black River (Lat. 48° 46' N.; Long. 87° 17' W.). Some specimens from one of these veins discovered by Mr. Salter, the surveyor, gave me (by mechanical analysis) very nearly 4½ *per cent.* of Molybdenite, an amount equivalent to about 100 lbs. per ton. Copper pyrites is also present in the quartz.

5. *Barytine,* BaO, SO^3.—It has long been known that many veins of Heavy Spar or Barytine occur on the north shore of Lake Superior, several of these veins being almost free from colouring matter, and hence of good quality as a paint material; but I am not aware that any crystals from this region have hitherto been described. From the vein in Neebing township (about ten or twelve miles from Fort William,) in which the cockscomb variety of marcasite (described in Note 3) was obtained, I procured a great number of small crystals of this mineral, of a pale yellowish or reddish colour. The same forms were present in all, producing a combination of: 1, the base, $\bar{\infty}\breve{\infty}$; 2, a front-polar or macrodome, $\frac{1}{4}\bar{\infty}$; 3, a second or lower front-polar

$\frac{1}{2}\bar{\infty}$; and 4, the side-polar or brachydome $\breve{\infty}$,—the crystals being elongated in a right-and-left direction, *i. e.*, in that of the macrodiagonal or longer horizontal axis. Most of the crystals, apart from this elongation, offer a very symmetrical aspect; but in some, as often happens, certain planes become crowded out, or reduced to mere lines: a plane of the form $\frac{1}{4}\bar{\infty}$ being generally the sufferer in the present case. The angles measure as follows:—$\bar{\infty}\,\breve{\infty}$ (base) : $\frac{1}{4}\bar{\infty} = 158^\circ$; $\bar{\propto}\,\breve{\infty} : \frac{1}{2}\bar{\infty} = 141^\circ\ 4'$; $\bar{\infty}\,\breve{\propto} : \breve{\infty} = 127^\circ\ 15'$. Axes: *a* (vertical axis) $= 1{\cdot}315$; $\bar{a} = 1$; $\breve{a} = 0{\cdot}8141$. It should be observed, in reference to the crystallization of Barytine, that some crystallographers make the base, as here given, a side-vertical (or brachy-pinakoid of Naumann) $= \infty\,\breve{\propto}$. In this position, the front-polars, $\frac{1}{4}\bar{\infty}$ and $\frac{1}{2}\bar{\propto}$, become vertical prisms; but the side-polar or brachydome, $\breve{\infty}$, remains unchanged.

6. *Fluor Spar*, CaF.—Examples of this mineral are met with in many of the copper-ore and other veins of Lake Superior; but some unusually fine specimens have been lately obtained from large vugs in a broad vein of amethyst-quartz, situated a few miles inland from the N. E. corner of Thunder Bay. These specimens are crystallized in simple cubes, most of which measure from two to three inches across, and they occur as a bold capping on equally large pyramids of amethyst. The fluor spar is thus the later formation of the two, and it is in itself coated with a still newer formation of drusy pyrites in small cubes. Its colour is partly pale greenish, but mostly violet, like that of the chief mass of the quartz on which it lies. These fine crystals may be obtained in blocks of the dimensions of several cubic feet, forming magnificent museum-specimens. For those in my possession, I am indebted to the kindness of Mr. Herrick, by whom the vein has been somewhat extensively opened out. For several fine crystals of amethyst from this locality, I have also to thank Mr. McIntyre, of Fort William. Many of these amethyst crystals exhibit externally, or along their edges, a deep brownish-red colour, from the presence of innumerable spots of sesqui-oxide of iron deposited within or just beneath the surface-layer.

7. *Anthracite.*—In the Revised Report (1863) issued by the Geological Survey of Canada, a small amount of anthracitic matter is said to occur in cracks in the chert beds of the Lower Copper-bearing Rocks of Lake Superior, as seen in the vicinity of Thunder Bay. A small vein of this kind was discovered by Mr. Herrick, on the north

shore of the bay, about two years ago. The vein in question averages about five or six inches in width, and is nearly vertical. A thin layer of colourless quartz lines the walls on each side. This is followed by about half-an-inch or rather more of Iron Pyrites, possessing a radiated structure, but crystallizing on its inner surface in combinations of the cube and octahedron. To this succeeds another band of white, crystallized quartz; and the middle of the vein is filled with black and highly lustrous anthracite. The vein thus offers, though of small size, a fine example of banded or riband structure, shewing, in passing from one wall to the other: 1, quartz; 2, iron pyrites; 3, quartz; 4, anthracite; 5, quartz; 6, iron pyrites; and 7, quartz. Here and there, a thin coating of anthracitic matter occurs also on the surface of the pyrites, or runs through the latter, dividing it into two or more layers. So far as my observations go, all the large mineral veins ot this district exhibit, on the other hand, a brecciated structure, with very subordinate or irregular indications of banding.

The anthracite from this vein possesses the following characters:—Colour, jet-black, with high lustre; streak, greyish-black. Very brittle. Fracture, more or less conchoidal. H=2·25—2·5. Sp. gr. (as determined by a light sp. gr. bottle)=1·43. Before the blowpipe it cracks slightly and loses its surface lustre, but exhibits no further change. Heated in a small flask or bulb-tube, it gives off a little moisture, but without any accompanying trace of bituminous matter. In powder, in a thin platinum capsule, it burns completely away, but a long-continued ignition over a Bunsen's burner or double-current lamp is necessary to effect this. Carefully picked fragments do not leave a trace of ash: a peculiarity which must not be lost sight of, in attempted explanations of the origin of anthracitic matter in this apparently abnormal position.

Two assays gave the following results:

Moisture	2·08	2·23
Additional loss by ignition in closed vessel	3·56	3·62
Ash	0·00	0·00
Fixed carbon, by difference	94·36	94·15

REVIEWS.

Our Convicts. By Mary Carpenter. 2 Vols. Longman & Co., London; Dawson & Co., Montreal.

Very slowly and gradually have even the wisest men learned to recognise law in the results of human feelings and actions, as well as in the mutual influences of external things, and have thus laid the foundations of a science having for its object the social relations of human beings, and the means by which they may be so regulated as to confer the greatest possible amount of diffused happiness. Much more slowly still the masses of mankind are learning to put some confidence in the truths of this science, and to attempt their application in the management of affairs, instead of regarding them as unsubstantial theories with which ingenious men amuse themselves, but which have no concern with the actual business of life. Political principles have been regarded as party prejudices, traditional sentiments, or professions made with a view to personal aggrandisement. Questions affecting the wealth, progress and prosperity of whole communities, have been decided in conformity with the confined views and selfish interests of individuals, without a thought of there being better means of judging than their limited experience and petty aims. The rude methods of barbarous times have been continued in the treatment of those who violate established laws, or have only been relaxed into an inefficiency of control or an encouragement of wrong-doing which is most alarming to contemplate. Gradually, however, the signs appear of a better state of things: already we have a political science, and an economical science, resting on solid foundations, clear as to what they undertake to accomplish, and leading towards practical conclusions which all intelligent men will be obliged to accept—and if other special branches of social science can scarcely be said to have advanced so far, it may be found, that, having less powerful interests and prejudices to contend with, when once brought into notice, their progress will be more rapid. Nothing can be more important than the branch of social science to which Miss Carpenter's book invites our attention. The pestilence of crime is worse than plague, yellow fever, or cholera. Like them, its existence depends on definite causes which may be understood, and to a considerable extent counteracted. As with them, our hope of checking its ravages, and of treating with success individual cases, must depend on our exact acquaintance with the real nature and origin of the disease, and with all the influences from without and from within which promote or may be used to restrain it. Whilst terror was regarded as the only efficient preventive of crime, and to maintain it in the public mind, whilst getting rid of dangerous characters, torture and death were freely employed, the management of our criminal population was simple and intelligible, but most revolting to humanity. These times have passed away, and if it cannot be said that better means have yet been brought into action for checking crime, at least an end has been put to wholesale slaughter and disgusting cruelty perpetrated under the sanction of law. If our prisons are far from yet being, what they ought to be, schools for reformation, they are at least no longer the foul sinks of filth, disease and misery which once they were. We might be tempted to congratulate ourselves on this degree of progress if we could be sure that we are still advancing in the right direction, but the whole subject seems to be attended with such difficulties, the confusion in the popular mind so great, and the evils resulting from a total failure thus far in the attempt, on a large scale, to repress crime, and the degree in which it is even multiplied by the methods employed against it, are so alarming, that instead of finding any cause for satisfaction in our actual condition, it ought to be to us a source of constant anxiety, and a demand for perpetual efforts for the attainment of a better system. It cannot be but that a better system is possible. The simple fact is, that at present, imprisonment only fosters criminal dispositions and returns men on society more determined and better prepared to prey upon it; transportation is prohibited by the impossibility of finding a suitable field for it, as well as on account of other grave objections in respect to its expense and its deficiency in most of the qualities of a useful punishment, and branding, public flogging and other attempts to affix permanent disgrace to criminality, are known only to create a desperate class, and are utterly opposed to the humane feelings of the age in which we live. What then is to be done that crime may not eat into the very vitals of Society, and ere long utterly destroy our boasted civilisation? What most readily occurs to most people is that we should increase the severity of our punishments in order to make them more effectual in the way of warning. This implies that men can be terrified from the commission of crime, and that terror is the most certain mode of influencing them in our power. We hold, on the contrary, as was long ago clearly proved by Mr. Roscoe in his admirable papers on the subject, that excess of punishment above what is appropriate to the offence, and tends in other ways to good purposes, never has the effect of deterring from crime; that men in general, constantly led to regard determination and bravery as noble qualities, and readily hoping that they shall in some way personally escape the threatened danger, and especially the criminal class which is trained to daring, cannot be frightened from their course, whilst extreme severity always enlists public sentiment in favour of the sufferers, so that those additions to punishment which are especially intended to make it exemplary, always fail in their intended effect, and are productive of more evil than good. This being so, as we firmly believe that both reason and experience will prove, we have no resources left to us but in judicious efforts to limit the causes of crime, and in a determination to make the punishment which is in our power, imprisonment, effectual both in creating a strong desire to avoid it, and in improving, and in a large proportion of cases, restoring the character of those subjected to it. If we judged of what may be done from what is done we should indeed be driven to despair, but besides what is suggested by an acquaintance with our common nature, which, if it exhibits much frailty and imperfection, also plainly shows capacity for good and susceptibility to the influence of motives, there are happily experiences, though as yet comparatively few and limited in their influence, which establish to an absolute certainty, the possibility of making punishment a great power in society for checking crime and reforming those who have been guilty of it. That we may see how this can be done we must begin by ascertaining the actual facts respecting the condition of our criminal population, and the influences to which they are ordinarily exposed, and we must then examine what reason and experience suggest respecting better methods than have as yet been generally adopted. Plain, well-authenticated statements of fact are of all things most effectual for rousing indifference, overcoming prejudice, and stimulating to exertion in contending with tremendous evils. All who desire the most valuable information on this great subject are deeply indebted to Miss Carpenter for the work now before us. It may possibly occur to many that it cannot be to a lady that we must look for useful information on such questions as relate to crime, criminals and the means of practically dealing with them. To such we can only say, try and judge for yourselves before you reject valuable assistance because it comes from an unexpected quarter. You will find the lady appealing to the best sources of knowledge, not unaided by some of the highest authorities of the age on such questions. You will find her uniformly employing a judgment trained by the best education and matured by practical experience in connexion with juvenile reformatories, to which she has benevolently devoted so much of her attention. You will find her uniting the delicacy which belongs to her sex and culture with a dignified sxperiority to mere conventionalism, and an earnestness of philanthropic zeal, which make her fully equal to what she has undertaken; and it is our belief that there is scarce a man to be found, however able, enlightened and benevolent, who could have accomplished the work as well as she has done. It might possibly occur to some that in a new country like Canada we can have little to do with the difficulties attending the treatment of criminals, and that we may safely watch the experience of other countries without any extreme anxiety as to the adoption of immediate measures different from what have hitherto been deemed sufficient. Such persons show as much ignorance of what is passing around them as neglect of such wise cautions as *obsta principiis*: Make your arrangements before-hand to meet difficulties and dangers which must arise, and which will be the more formidable in proportion as they are allowed time to come to a head before they are provided against. Unfortunately it is too certain that in proportion to the numbers and degree of crowding of our population, we have more crime than older countries, and are already suffering severely from the insufficiency of our means of contending against it. Nor is this greatly to be wondered at when we consider that, among persons induced to emigrate, there is a larger proportion than in an equal number of settled people remaining at home, of the less steady and respectable class; that religious and harmonizing influences are with much difficulty brought to bear on a very scattered population, and that adjoining by a long frontier a great nation with the same language and general manners, we are of necessity subject to receiving from them many of their worst characters, who find it convenient to change their residence, whilst, from our smaller body, they cannot draw off anything like an equal number. We must not, then, flatter ourselves that inquiries respecting the origin of, and the means of suppressing crime, do not immediately concern us. On the contrary, we ought to feel most deeply interested in them, and most anxious to learn what can be done to save our country from evils already severely felt, and in prospect overshadowing our future with a dark cloud. With these preliminary observations, we shall lay before our readers such a slight abstract of Miss Carpenter's work, with illustrative extracts, as the space at our disposal will permit, earnestly recommending them to study it in its details, and that not from mere curiosity, but with a view of practically understanding a subject in relation to which they may hope to serve their country and their fellow-creatures. We must begin with a few paragraphs from the commencement of the book:

> "'Our Convicts!' They are a part of our society! They belong to ourselves! They are not only subjects with us of the same great British empire on which the sun never sets, but they belong to the same British Isles, the same small centre of civilization, the same heart of the world's life, the same Island, small in geographical extent, infinitely great in its influence on the nations,—whence must go forth laws, principles, examples, which will guide for better or for worse the whole world!
>
> "Fain would we say that these convicts are not *ours;* that they have cut themselves off from us; that they have excommunicated themselves from civilized society by their own acts; that they no longer belong to us. The very name of "Convicts" excites in the mind an idea of moral corruption which would make one shrink from such beings with a natural repulsion, which would lead one to wish only that like the lepers of old they should dwell apart in caves and desert places, warning off the incautious passenger with the cry "unclean, unclean." We might desire to rid ourselves of them by sending them off to some remote region, where Nature herself should guard them with her impregnable walls of ice, scantily yielding them bare subsistence from a barren, grudging soil;—or to some spot where they should be cut off from the civilized world by the mighty ocean,—and where their fiend-like passions should be vented upon each other, not on peaceable and harmless members of society. Many would fain thus separate themselves from Convicts; would gladly thus rid themselves of the awful responsibility which lies in the words—"*Our Convicts.*"
>
> "*But they cannot!* These Convicts are men, are women, who were born among us, reared to manhood and to womanhood among us. We have mingled with them in the ordinary walks of life, we may even have eaten at the same board with them, and until the law put its fatal mark upon them, so that they were henceforth to be known as Convicts, we did not see anything in their outward appearance, whereby, in their various grades of society, we should have distinguished them from other men and women. But now this very legal sentence which makes us wish to separate them entirely from ourselves, only binds them closer to us. They were *free* agents while they were pursuing their mischievous calling, while they were transgressing the laws of God and of man, and we did not separate ourselves from them; had they been then branded by the indignation of society in England, they might have gone to other parts of the empire, and

there retrieved their character or plunged into fresh crimes. We should not then have been responsible for them. But now all is changed. The sentence of the law has placed them in our keeping for many years. We cannot, now they are *legally proved* guilty of crimes against society, drive them from our country, or banish them from our shores, content that they shall still be responsible for their crimes to the Judge of all, before a higher tribunal. We have deprived them of the right to guide their own actions since that right has been abused; we subjugate their will, we confine them in our own country, and put them under such treatment as we consider best for them and for society. We therefore have doubly bound them to us, and ourselves to them. They are *ours*, and we *cannot*, if we would, shake off the responsibility arising from this relationship, however painful it is. It behoves us then to consider the 'Treatment' which 'Our Convicts' should receive."

Next we will give our author's preliminary sketch of her plan:

"We shall first consider who Convicts are.

"The fact of their being classed together under the same brand of the law, by no means makes them of one nature or of the same degree of guilt. The commission of the same legal crime by no means indicates the same moral depravity. Burglary may involve daring robbery and murder, and may be perpetrated by one long experienced in all the arts of housebreaking, who wanders from county to county like a wild beast seeking his prey, or one who would be a brigand or a bandit in a country under less controul than our own;—while, perchance, an offence legally designated by the same term is committed by a little girl of ten years old, whose sole fault was, that having lost her Mother, and being necessarily without proper care from her Father, who was compelled to earn his daily bread, she had made her way into a neighbour's house to supply her wants. Robbery from the person may be perpetrated by a daring and experienced Convict, ready to add violence or even murder to his theft; or by a small child of nine years old, who is trying the lessons which have been given to her diminutive fingers by a wicked parent. We cannot classify Convicts by their nominal crimes; we shall endeavour to form some correct idea of them by other means.

"It will be important, in the next place, to form some idea of how persons arrive at the degree of hardened vice which our investigation will disclose. We must try to learn the cause of the disease as a guide in our treatment of it, and as a means of checking its progress.

"The principles which have been laid down by experienced persons, and which have been proved to be true by actual success, will next be considered; facts will be adduced in demonstration of them.

"After this preparation, we shall endeavour to form some clear idea of the system of Convict discipline actually in existence in our country, with its results. In doing this, it must be clearly understood that no means of information are open to the writer but such as are perfectly accessible to every one who chooses to investigate the subject. The Prison Matron revealed secrets of the prison-house of which none but a resident in that abode of horrors could have been possessed. Persons officially connected with the Government Gaols have sources of information which none but those so circumstanced can obtain. They who enjoy personal intercourse with our rulers, may understand many things which are mysteries to those without the privileged circle. Access to the establishments obtained through persons in office, may reveal at a glance to an experienced eye what may be a lasting perplexity to the less privileged. But the writer of this work has enjoyed none of these advantages. Happily, however, there are open to all, sources of knowledge even more satisfactory, in the evidence which was laid before the Royal Commission last year, and from this, and from the witnesses before various Parliamentary Committees, we shall be able to obtain reliable information.

"Of the *results* of the system adopted in Great Britain, we must form a judgment from less official sources, for unhappily in our country there has never yet been adopted such a system of identification and registration of criminals and their acts, as would give even the possibility of an approximation to truth from any criminal statistics that exist. We find even that in many cases the persons who may be supposed most cognizant of actual facts, and most in a position to obtain reliable statistics, arrive at conclusions most at variance with the reality which is patent to the public, and that they are most vague and theoretical in their statements. We must, therefore, be satisfied with such amount of knowledge of results as we can obtain from ordinary facts and general opinions founded with reason upon them.

"Having thus endeavoured, from such means of information as we possess, to obtain some distinct view of the Convict system in Graat Britain, and the results of it, we shall study the working of a system founded on different principles in the Sister Island; and here, an accurate identification and systematic registration of criminals throughout the country, will enable us to arrive at definite results, which may be considered reliable, as they are thoroughly supported by the independent testimony of public opinion. The writer has here had the advantage of both personal and official information respecting the working and the results of the Irish Convict System, which will be presented to the reader.

"Whether removal to another country can take part in our Penal System will then be considered, and the evidence on the subject will be analysed, which was last year brought before the Royal Commission. Improvements in our present system will also be suggested, as they have been brought forward by many experienced persons.

"In conclusion, we must remember that the Convicts are still *ours*, even after their punishment, and must return to our midst when they have been discharged from the Convict Prison. Society has a right to expect that during the period of a costiy incarceration the best possible means shall be adopted by the Government for the reformation of those entrusted to them, for their preparation for reabsorption into the community; but, on the other hand, the Government must be supported in its efforts by society, and especially by that portion of it which is professedly Christian. What has been done to promote this great object, and what may further be done, will be briefly shown."

We thus have before us the plan and object of a work which, in two 8vo volumes, embracing 673 pages, treats in an orderly, practical, and at the same time scientific manner, one of the most important subjects that can engage the minds of the thoughtful and benevolent. It would be impossible for us here even to touch upon each distinct branch, or to attempt maintaining the connection of the reasoning. If in hastily running through it again for this purpose we can succeed in bringing forward a few passages of independent interest, which may lead attention to the book itself, our object will be fully answered.

At p. 24 is a curious estimate, apparently not exaggerated, of the loss to society by 16 thieves, whose names, ages and length of criminal career are given, amounting to no less than £26,500. This must, at least, serve to give one striking, though in reality the least important, view of the interest attaching to the subject.

At the beginning of the second chapter, entitled "How are our Convicts made?" after referring to the specimens, if we may so speak, of criminals given in the preceding pages, the author proceeds:

"But these persons have not suddenly become so lost to all good, so completely the slaves of sin. We should try to gain some insight into the nature of the temptations and circumstances which have plunged them to such a depth of wretchedness. Before attempting to cure we must learn the nature of the disease, and we must endeavour to ascertain whether there are not evils for the existence of which society is directly responsible, which must, unless removed, forever perpetuate in our midst the mass of corruption from which we are suffering.

"How do men and women arrive at a condition of so much depravity?

"How far is society, directly or indirectly, to blame in the matter?

"These are questions which we shall endeavour to answer in the present chapter.

"Here is a history of a criminal career given by an old offender himself to the Chaplain of the Gaol, Rev. W. OSBORN, of Bath:—'I have been told a thousand times to go and get work, but it was never said to me during twenty years, while in or out of prison, 'I'll give you work.' Hence I have cost the country some two thousand pounds, and I expect to cost a great deal more yet. *I was sent to gaol for two months when a boy for stealing a loaf of bread, and no one cared for me.* I walked to the seaports, but in vain. I tramped, sore footed, thousands of miles when I was a lad, in order to get honest employment, but it did not answer. I was tempted to steal. I stole. I was imprisoned. I was sent to Bermuda. I have learnt the trade of a professional thief, and now I intend to follow it. I believe all philanthropy to be a mockery, and religion to be a delusion, and I care neither for God nor man. The gaol, penal servitude, and the gallows, are all alike to me.'

"This is, probably the history of thousands; and who is to be blamed? Are there no accessories to the life this man is leading? How was the boy who would 'tramp sore footed thousands of miles to get honest employment' transformed into a man who disbelieved humanity,—who scoffed at religion, and consequently defied the laws of God and man?"

And after adding two other instances, she says:

> "Now these three cases are probably representative ones of a large class of our Convicts, and they give us some idea of the way in which they became cut off from society. No individual person appears directly to blame for the condition of any one. And yet we can hardly hold any one of them morally responsible for his position in our Convict Prisons. What would any of the children of the upper classes become if so tossed about in the world? Is our society rightly constituted, or truly Christian, if young, inexperienced persons, without proper parental guidance, are to be so left to the hard usage of the world?"

The following may be taken to be principal sources of criminal conduct in the young, and means of training them to increased skill and recklessness in their evil courses: Gross ignorance and neglect in childhood, from the poverty and wretchedness of parents; direct incitements and encouragements to crime by wicked parents; schools for crime kept by persons who profit by instructing children in the various arts of thieving; repeated short commitments to prison for the earlier offences, hardening and corrupting the character, and completing the education in all the forms of criminality; corrupt and impure literature; such places of amusement as low penny theatres, singing and dancing rooms, &c., and ready access to intoxicating liquors. Striking examples are given of the effects produced by these various influences, which cannot but deeply affect the heart of the patriot and the Christian, and arouse him to greater exertion in stopping the sources of evil and checking criminality in its bud, instead of letting it grow and strengthen until it is a fit subject for the severest punishment.

The third chapter, "On the Principles of Convict Treatment," one of the most valuable in the book, is chiefly employed in establishing the principle that reformation must be a leading object in all punishment. We quote from its commencement a passage of great force:

> "Whatever may be the cause of their present condition, and however much or little they may morally be themselves to blame for it, the habitual offenders who constitute the largest proportion of the inmates of Convict prisons are in a state of absolute antagonism to society and disregard of ordinances, human and divine. They are usually hardened in vice, and they concern themselves with the law only to endeavour to evade it. They dislike labour of all kinds, and to supply their own wants exert themselves only by preying on the property of others. They are self-indulgent,—low in their desires,—ignorant of all knowledge that would profit them,—skilful only in accomplishing their own wicked purposes.
>
> "But they are still men and women, possessed of an immortal nature; still they are the children of the same Heavenly Father; still they are our fellow-citizens.

"We have traced the course by which Convicts have arrived at their present very degraded and dangerous state. Though in some cases a succession of unfortunate circumstances, over which society had no direct control, may have carried on the unhappy victim from one step to another, in each plunging him deeper and deeper in an abyss of crime, from which he was unable to extricate himself, and for which society could not be held *directly* responsible,—yet even in these cases we must have perceived that the prevalence of a more Christian spirit in society, of a stronger moral repugnance to evil, of a greater readiness to help the weak, may have arrested the criminal in an earlier stage of his career. But, in the great bulk of the instances adduced, young persons have become gradually hardened in guilt through causes over which they had no control, and for which society is *directly* responsible. The practice still continues of sending children to prison, though for so long a time it has been declared by the highest authorities worse than useless, and though the existence of schools authorised by the Government renders this incarceration unnecessary. The Workhouses do not yet provide a true home for destitute children, who find themselves better cared for in the hands of justice than in the keeping of those misnamed their guardians. Dens of infamy are still tolerated in our cities, to give to our young children that schooling to vice, which no one gives them to lead them in the right way. The uncertainty of punishment, the glaring defects still existing in our criminal law, allure by impunity or slight punishment to repetition of crime. Society *is* responsible for all this, and therefore is bound to remedy as far as possible the evils arising from these various abuses. It is, then, our solemn duty, both as members of society and as professing Christians, to endeavour to bring these people to a sense of their responsibility to God and to man, and of their own immortal destiny,—to reform them.

"To induce any permanent change in natures so perverted and hardened, it is evident that no merely external means can be of the slightest value. While under compulsory detention they may be bribed or terrified into some degrees of quietude and submission, but their *natures* are not touched by these means. They return from the monotony and forced propriety of their prison life, only with fresh zest for the exciting career from which they have been for a season snatched. Their long abstinence from intoxicating stimulants is compensated by increased excess. The hated forced labour of their servitude is at once abandoned for the wonted indolence of their old life. All who are acquainted with the histories of criminals are well aware that this is the ordinary result of the present treatment of Convicts, and hence arises a profound and general disbelief in the possibility of reformation among those whose duties lead them to a knowledge of the 'dangerous class.'

"A different principle of management produces different results, and does effect real reformation, provided all external means are adopted in developing the principle which experience and sound judgment suggest."

The argument in this chapter is strengthened by high authority, and by an account of the success attending the plans of Colonel Montesinos, at the prison of Valencia, in Spain; of Herr Von Obermaier, in the prison of Munich; and Captain Machonochie, in the penal settlement of Norfolk Island. There can be no doubt whatever that in these cases convicts of the worst character were governed by moral influences, and a real reformation was produced in many instances. The effect may be attributed to the peculiar character of the men, and it may be thought impossible to find officers for public gaols who could carry out such systems; but, Miss Carpenter argues forcibly to prove that the influence depended on principles which may be sanctioned by public authority; and, in that case, may be usefully applied by ordinary officers carefully selected. A very interesting portion of this chapter consists of a long extract from an admirable paper, read at the general meeting of the Law Amendment Society, January 12th, 1863, and by them ordered to be printed; the author of which, Matthew Davenport Hill, Esq., Recorder of Birmingham, is one of the most intelligent, enlightened, and persevering advocates of the improvement of prison-discipline. We wish we could copy the whole passage—the opinion of an eminent lawyer—and, as recorder successively of several great cities, an experienced judge, being likely to have more weight, with many readers, than any amount of argument even from persons of great practical experience, as well as intellectual power, who have not the same connection with the administration of Law.

Our author's next chapter relates to the English Convict System; that is, to the system pursued in those gaols which are intended for the reception of persons undergoing a sentence of penal servitude, according to the plan followed since the unavoidable discontinuance of transportation, by the refusal of nearly all the colonies to receive convicts. Now this system is professedly reformatory, and as it has certainly failed to produce the real reformation of any considerable number of the convicts; and has, on the contrary, been attended by much evil, the conclusion naturally to be drawn is that the attempt to make prison-discipline reformatory has failed, and this opinion has actually been adopted by many. Miss Carpenter feels herself, therefore, called upon to show—and she has shown most clearly—that the system adopted in these gaols was not what is approved by the advocates of the reformatory plan of punishment—was not that, or at all resembling that, which has been so successfully applied in the reformatory schools for juvenile offenders; and was not such as to give any reasonable hope of a successful issue. The evidence on this subject is so complete that the cause for wonder is not the failure of the system; but, that any other result should ever have been expected.

Under the best conceivable system, the re-absorption into society of those who have undergone penal-discipline is attended with serious difficulty. Under a system so faulty as the present English one has been shown to be, only the worst results could be anticipated; and, the chapter on that subject accordingly establishes the danger and mischief of the Ticket-of-leave System.

The chapter on transportation seems chiefly intended to show how to the extent that it is still possible, in Western Australia, by good regulations in the colony, a proper selection of subjects, and the use of good influences during the long voyage, some good use may yet be made of a punishment no longer possible or desirable in its old form. A large portion of the second volume is devoted to the Irish Convict System, founded on the same Act of the British Parliament, in 1853, which originated the English System; but, with so different a result, that whilst the one, from certain unfortunate mistakes, must be regarded as a lamentable failure, the other is a cheering proof of the practicability of reformatory-discipline, and of the adaptation to human nature of those wise and humane principles which had recommended themselves in theory, but which the many were afraid to apply in practice. Let the nations of the world profit by the example of Ireland, and let the name of the originator of its penal-system be enrolled among the benefactors of mankind. As, directing attention to all that is contained between them, we shall quote the opening and concluding passages of Miss Carpenter's three chapters on the Irish Convict System.

"The English and the Irish Convict Systems were both founded on the Act of Parliament of 1853. The object of that Act was to make such changes in the system adopted towards Convicts, as would prepare them for discharge in our own country, since our Colonial provinces were virtually closed against them, Western Australia only consenting still to receive a small number annually. We have seen that in England the system has hitherto been a failure, but have traced that failure, not to the principles on which that and the subsequent one of 1857 were founded, but to certain omissions and additions which were incompatible with the successful working of the principles. We now proceed to the examination of the Irish Convict System, which has fully developed the principles of both those Acts. The results of the ten years during which it has been in operation demonstrate, beyond any possibility of doubt to an impartial observer, not only the truth of the principles embodied in the Acts of Parliament, but also of those moral principles which are so embodied in it as to constitute its peculiar features, and of the excellence of the machinery by which these are brought into action The wonderful combination of all these by the founder of the system, Sir WALTER CROFTON, demands from us very close investigation of its principles, and examination of its details."

* * * * * * * * * *

"The foregoing simple narrative of the actual progress of the work will, we trust, give a feeling of absolute reality to those who, after reading the various accounts of the Intermediate Prisons, which have, from time to time, come before the public, may have been disposed to believe them an illusion, a pleasing fiction, something too wonderful to be entitled to belief. It could not be imagined that the solution of one of our chief social difficulties had been effected in that Island which, in other respects has been so great a source of anxiety to our rulers. Yet it is actually the case. Eminent continental jurists who had arrived at philosophical conclusions based on deep principles of government, and on the laws of human nature, found to their surprise and pleasure that these principles had actually been developed in Ireland, and acted on for a sufficient number of years to prove their soundness. It is not probable that the Directors of the Irish Prisons had any philosophical system before them when they began their work. They came to it with a full appreciation of what had been already done in England. They had the same Act, that of 1853, as the basis of their operations, and they determined to work out the principles of that Act to the utmost of their power. They found peculiar and unexpected difficulties in their way, which they had to surmount. The disposal of the Convicts by transportation was suddenly cut off from them, and henceforth they must discharge their prisoners at home. An especial aversion existed in the Irish mind to come in contact with those who had endured a penal sentence. The unfortunate men themselves were in a very low state of degradation, physical, intellectual and moral; hence they were not in a condition to enter the labour market, even if it had been ready to receive them. The Government Prisons were in a most unsatisfactory state, both as regarded arrangement, accomodation, and even sanitary condition. The officers also were very ill adapted to their work, and it was necessary to train almost a new staff of subordinates. This was not so easy a matter; for though it has been asserted that it was more easy to adapt the new system to Irish than to English prisoners, experience proves that peculiar qualifications are required in controlling the Irish. Many officers many school-masters may be very efficient with the English, who would be totally incapable of acting satisfactorily with the Irish of the lower classes. The Irish are excessively sensitive to wrong and injustice, whether real or imaginary; yet they are equally susceptible of kindness and sympathy, and extremely grateful for them, especially when received from persons in a higher rank, and where there can be no possible suspicion of a sinister motive. It is not, however, always easy to meet with officials who possess such moral qualities as will thus obtain their confidence, and secure their willing obedience. The Directors indeed state in the First Report that they apprehend greater difficulties than have existed in England, with regard to the character of the prisoners, especially as a large number of those who were at that time in the prisons were brought into their criminal position by want of work and extreme distress. We have yet to learn that the Saxon is less amenable to reason and to moral influence than the Celt, and if the means adopted to surmount the difficulties which were adopted with the Irish Convicts were permanently successful, there can be no doubt that they would be so with the Convicts of Great Britain.

"The means employed were not mere outward appliances. When the Irish Convict System is spoken of, mere mechanical arrangements are not intended; these might be adopted elsewhere and fail, if the spirit were not infused into them which animated all concerned in working it in Ireland. There, from the first day of his entrance. the Convict was taught and gradually led to feel, that though he had, through his own misdoing, lost his personal liberty, yet that it was for himself to control his own will and bring it into conformity with law and duty; and though he had apparently lost the power of shaping his own destiny, yet that in reality, he still possessed it, and that his future, whether for good or for evil, would depend absolutely on himself. The Convict, by degrees, felt hopes of himself, and remembered he was a man, a member of society, one who might fill an honourable place in it, because he perceived that those put in authority over him remembered it too, and had hopes of him, and confidence in him. How could those Convicts fail to comprehend that there was a true human sympathy with them, when the Chief Director devoted his time and labour to converse individually with each one of the four thousand thus incarcerated, learn his difficulties, trials and temptations, study his character, and thus be prepared to give him the friendly advice he needed when again in the world? Combined with this sympathy was strict justice; to every one the inevitable consequences of his own actions were sure to follow, whether good or bad. Here was a law established founded on right and equity and truth, and every one was bound to obey it, whether officer or prisoner. There was no favour, no partiality, no bribery, no indulgence for any one, whether high or low. How could the Convicts do otherwise than respect this justice, and feel willing to obey a righteous law, when they knew that any one of them might appeal to the Director if he thought himself aggrieved, and that his case would certainly receive an impartial investigation!

"A perfect freedom from religious differences constitutes another important feature in the Irish Convict System. This is at all times difficult to attain, wherever persons of different religious denominations are working together in the same establishment; it would be particularly so in Ireland, where unhappily, glaring instances of hostility, arising from religious differences, are continually occurring The true spirit of Christ should display itself in mutual forbearance, and in that respect for the religious opinions of others which we desire for ourselves. Such has been found in the Irish Convict Prisons, where judicious regulations, strict justice, and mutual courtesy have enabled Catholic and Protestant officers to work in their respective spheres, without interference in their duty, and with mutual courtesy. This is evident in the Reports of the officers;—we have personally witnessed it. The effect of such genuine religious toleration cannot be too highly estimated.

"May these be ever the features of the Irish Convict System, and may it continue, as it has done, thus to blend justice with mercy, and to bring back the erring and wandering into the fold of Christian society!"

The excellent chapter on Female Convicts we can but recommend to attention, having no space either for analysis or comment. The chapter on improvements suggests three, as likely to produce a very great change: 1st., Strict registration of criminals, aided by photography; 2nd., Greater certainty and uniformity of judicial sentences; and, 3rd., Cumulative sentences. The last is of peculiar importance. It was the opinion of Mr. Roscoe, that to make discipline effectual, there must be a power of retaining convicts in confinement until they give reasonable proofs of reformation. So Captain Maconochie, in his evidence before Lord Caernarvon's committee, says, as quoted by our author:—

> "If he did not become good with one such punishment, he would become better with a second, and better still with a third, and progressively he would be an altered man, I am confident. He would either be an altered man, or (which is another point that I wish very much to impress upon the Committee) *he would be shut up, through his own fault, for life; because in the administration of punishment I would show extreme severity to frequent reconvictions.*"

And Mr. Recorder Hill gives strong and decisive testimony to the same principle. The next chapter is on prevention. Since habits of drunkenness and debauchery, a corrupt literature, a neglected and ill-trained childhood, and even special schools for instruction in crime, are principal causes of criminality, we know well against what evils we have to guard, in order to prevent the extension of crime. There is not one of these causes which may not, to a considerable degree, be restrained or counteracted. Much may be done by good legislation, and even more by the voluntary efforts of the better part of society. One of the most important agencies is that of Reformatory Institutions for juvenile offenders, under the authority of Government. The success which has already attended these institutions is great and encouraging. Then we have the improvement of the condition of pauper children, and the general extension of education among the people. This last has for many years been an object of intense desire to enlightened patriots and philanthropists, who well know that without universal and even compulsory education, no great improvement in the condition of the neglected classes can be accomplished; but, all efforts in this direction have hitherto been thwarted by the sectarian feelings of rival churches. Canada is, happily, thus far exempted from this great difficulty, though there are many of our people who are recklessly endeavouring to bring it upon us; but, in *offering* education to all, we have done but half our work, well-knowing how many, from various motives, will refuse to avail themselves of it; and, if we are to enjoy the benefit of general education, as a preventive of crime, we must compel those to come to our schools whom the indifference, poverty, or wickedness of their parents would keep away.

In England, what are called Ragged Schools aim to provide, in some degree, good influences and useful instruction for the most neglected class. They have been found, in various places, to be attended with the greatest advantage to the scholars and the community at large; but, to extend them sufficiently, and place them on a solid basis, they absolutely need government aid, which has hitherto been sought in vain, and the claim for which is energetically and powerfully urged by our author. The concluding chapter of the work is on "the co-operation of society;" a short extract will show its spirit:—

> "It has been a painful task, probably, both to reader and to writer, to follow our Convicts in their lawless career, living in defiance of God and of man; to see them dogged and defiant in incarceration; to behold them, when in partial liberty, only more daring, more hostile to society, gathering strength for new outrages; to find them again in the world, schooled to new modes of wickedness, corrupting all within their sphere, preying on the peaceful part of society, and, as it were, licensed marauders, until they should, by some extraordinary deed of wickedness, again put themselves within the grasp of the law. It was necessary to know the evil, in order to seek for a cure;—to learn the causes of it, that we may discover means of preventing its constant recurrence.
>
> "We have not, however, been exclusively occupied with scenes of vice. We have had the happiness of contemplating order, diligence, a spirit of brotherly kindness and Christian obedience, succeeding a life of reckless lawlessness,—and this in a Convict Prison. We have seen the men who formerly were ruffians of various descriptions, skilful house-breakers, men who preferred a life of dishonest idleness to one of honest labour,—we have seen these very men, after their time of penal servitude had been completed, go forth in voluntary subjection to the law of the land, engaging in humble laborious work among their fellows, atoning to society for their past misdeeds by their present virtuous lives.
>
> "We trust, then, that faith in human nature, and in the power of the good and the true, has thus been strengthened, not shaken by the foregoing survey, and that many have been incited to put to themselves the question,—"What shall *we*, —shall *I* do?" It is the object of this concluding chapter to point out some of the ways in which society may thus cöoperate with the Government."

The object of our notice is to induce as many as possible to read the book.

If we consider the experience on the subject, which a life devoted to philanthropic labours has given her, and the diligence, care, and sound judgment displayed in the selection of materials, we shall see that Miss Carpenter is eminently fitted for what she has undertaken. We have not, here, a book of sentiment, or of speculative reasoning; but cautious deductions from facts, a sufficient number of which are brought under the reader's view, and argument in a truly Christian spirit, showing us how we may hopefully contend against crime, and limit its power—an object dear to the benevolent heart, for the sake of the unhappy criminals, but necessary for the security of society, and preventing an incalculable amount of suffering, loss, and anxiety on one side—of degradation, corruption, and ruin on the other.

W. H.

OBITUARY NOTICE.

Another of our greatest botanists has speedily followed Sir W. J. Hooker. Dr. John Lindley died of apoplexy on the first of the month (November) at his residence, Acton Green. near London. He was generally known as one of the most eminent botanists England has produced, and one of the most laborious and successful writers on the science. He held for many years the important offices of secretary to the Horticultural Society of London, and Professor of Botany at University College, London. He was the founder, and, up to his death, the Horticultural editor of the Gardener's Chronicle and Agricultural Gazetteer, which has done so much for the improvement of British Horticulture. To him, more than to any other individual, without even excepting Robert Brown, who, with more originality and intellectual power, was deficient in qualities fitting him for a leader of public opinion, is due the high merit of having practically introduced among British botanists the natural method of studying and arranging plants. In accomplishing this object he came into opposition with distinguished and excellent men, whom habit, the prejudices of education, and the influence of circumstancces, powerfully retained in the Linnæan school. And here we have to regret both that the views of a man of genius, industry and knowledge, like Lindley, were not listened to with more candour, and, even if they could not be immediately accepted by those accustomed to a different method, resisted with more respectful appreciation of their claims to attention; and. on the other hand, that he should have forgotten at times what was due to the position and real merits of opponents, and indulged in a strain of denunciation against the Linnæan artificial method as if only pernicious to science and against those who still clung to it, which was totally unwarrantable. Sir James E. Smith was a really eminent, as well as a most amiable and excellent man. As a botanist he was distinguished by knowledge of species and genera, and the power of characterizing them precisely and elegantly. He, too, first really popularised botanical science, and to the possessor of the Linnæan collection, who had at once obtained celebrity by that circumstance, a certain amount of prejudice in favour of the Linnæan system might be reasonably excused and treated with respect. At all events, the use of Linnæan descriptive language at a time when more correct language was scarcely known, might be regarded as a venial offence. Yet, irritated at the discouragement he had himself received, Dr. Lindley was an angry critic on Sir J. E. Smith, having even so recently as in his "Descriptive Botany," made a fresh attack on this eminent man for the use of Linnæan descriptive language, now, indeed, well-known to be erroneous, but when employed nearly universal, and that when in this very work he was himself sanctioning inaccurate terminology without the apology that might be made for Smith. For our part, loving the memory of Smith, yet admiring and appreciating Lindley, and desiring to do justice to both, we regret what was wrong in feeling on either side, and would hand both names down to posterity as worthy to be honoured for eminent services to science. These few words are forced from us by the article on Lindley's death in the *Athenæum*, which is unfair and ungenerous towards Sir Jas. E. Smith. The scientific writings of Lindley make up a long catalogue. The *Botanical Register* enabled him to figure and describe many remarkable newly introduced plants. The "Genera and Species of Orchidaceous Plants," and the "Folia Orchidacea," evince his profound acquaintance with one of the most curious and attractive of the natural families of plants. His "Fossil Flora of Great Britain" is a beautiful application of botanical knowledge in aid of a sister science. The "Theory of Horticulture" is justly stated "to have done more to put gardening on its proper footing than any other work." His series of elementary works has very high merit, especially the "Introduction to Botany," "Elements of Botany," an admirable compendium of principles, "Descriptive Botany," and "Medical and Economical Botany." But amongst his greatest works was "The Vegetable Kingdom," a condensed account of the structure, geographical distribution and uses of plants. In this work he has given his account of the alliances or greater orders of plants, which are capable of affording the most valuable aid to students, and in determining and characterizing which he has upon the whole been eminently successful. That his peculiar arrangement has not been followed in works of detail is much more owing to DeCandolle's series having become familiar through the Prodromus than to any persuasion of its superior excellence. Lindley's is a truly great work. It may be improved upon, but it is noi likely to be forgotten. As a philosophical botanist, a useful practical labourer, and a promoter and improver of the natural system in the study of plants, Dr. Lindley's fame is great and likely to be durable.

Amongst recent losses by death we have also to name Mr. Lovell Reeve, head of a publishing house in London, chiefly engaged in works on Natural Science, and himself a very eminent Conchologist, author of several important works on this science, especially the Conchologia Iconica, a series of Monographs on the genera of Molluscous animals furnished with shells, which takes the highest rank among works of its class, for its extent, beauty, and accuracy.

CANADIAN INSTITUTE.

EIGHTH ORDINARY MEETING—*4th March*, 1865.

Vice-President G. T. Kingston, M.A , in the Chair.

I. *The following donations for the Library were announced, and the thanks of the Institute voted to the donors:*

From J. M. Brodhead, Washington, D. C., U. S.:

Reports of Commissioner of Patents, 1861. Arts and Manufactures, Vols. 1 and 2	2

From P. McGregor, Esq., Barrister, Toronto:

Bailey's Astronomical Tables, 1827	1

From Dr. Oldham, Superintendent of the Geological Survey of India:

Annual Report of the Survey and Museum, 1863–64, eighth year.

Annual Report of the Survey and Museum, 1862–63, eighth year; 1 pamphlet

Memoirs of the Survey. Vol. 3, part 2,; 1 pamphlet

" " Vol. 4, part 2; 1 pamphlet.

From the Education Office, Upper Canada.

Remarks on the New Separate School Agitation. 1 pamphlet.

II. A Paper was read by the Rev. Prof. W. Hincks, F.L.S., &c.: "Thoughts on Belief and Evidence."

NINTH ORDINARY MEETING—*11th March*, 1865.

The Rev. H. Scadding, D.D., in the Chair.

I. A. G. McMillan, Barrister, Toronto, was elected a Member.

II. *The following Donations to the Library were announced by the Secretary:*

From Hon. J. M. Brodhead, Washington, D. C., U. S.

Report of the Superintendent of the Coast Survey, shewing the progress during the year 1862. Vol. 9, 1862–63. 1 volume.

Results of the Meteorological Observations made under the directions of the United States Patent Office and the Smithsonian Institution, from 1854 to 1859 inclusive. Vol. 2, part 1. 1 volume.

III. Oronhyatekha (a Mohawk Indian) read a Paper "On the Grammatical structure of the Mohawk Language."

TENTH ORDINARY MEETING—*18th March*, 1865.

Vice-President M. Barrett, Esq., M.A., M.D., in the Chair.

I. The following donations to the Museum were presented by S. Fleming, Esq., Civil Engineer:

One specimen of Iron Ore; one specimen of Pig Iron; one specimen of Bar Iron, from the Acadian Iron Works, Nova Scotia.

One specimen of Coal, from Newcastle River, near the head of Grand Lake, New Brunswick.

II. M. Barrett, Esq., M.A., M.D., read a Paper "On Bone, its History and Development."

ELEVENTH ORDINARY MEETING—1*st April*, 1865.

Rev. H. SCADDING, D.D., in the Chair.

I. *The Auditors were appointed:*

By the Chairman, W. J. Macdonell, Esq.; by the Meeting,

II. Dr. D. Wilson made some observations "On the changes of levels of land, especially of that part of Scotland between the Forth and Clyde."

EXTRA MEETING—21*st April*, 1865.

Vice-President M. BARRETT, M.A., M.D., in the Chair.

I. *The following Donations received for the Library since the last Meeting were announced by the Secretary:*

The Transactions of the Royal Society of Edinburgh. Vol. XXIII., part 3, for the Session 1863-64. 1 vol.

Proceedings of the Royal Society of Edinburgh. Session 1863-64. 1 vol.

Journal of the Geological Society of Dublin. Vol. X., part 2. 1 vol.

II. Dr. D. Wilson exhibited a collection of specimens of flint, bone, and horn implements, and cave Bremia, found in the Drodgne caves, in central France, by Mr. Christie, and transmitted by him to Dr. Thorburn, through whose kindness he was permitted to produce them.

III. Mr. S. McTavish, of the Hon. Hudson Bay Company, gave an account of the Esquimaux, and his experience in the north of the Hudson Bay Territory.

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO CANADA WEST,—AUGUST, 1865.

Latitude—43 *deg.* 39.4 *min. North. Longitude*—5 *h.* 17 *m.* 33 *s. West. Elevation above Lake Ontario,* 108 *feet.*

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resul't. Direction.	Velocity of Wind.					Rain in inches.	Snow in inches.
	6 A.M.	2 P.M.	10 P.M.	Mean.	6 A.M	2 P.M	10PM	ME'N		6 A.M.	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A. M.	2 P. M.	10 P. M.		6 AM.	2 PM.	10 P.M.	Re-sul't.	ME'N		
1	29.940	29.897	29.889	29.9082	60.1	72.8	67.0	67.70	+ 0.73	.376	.545	.539	.509	73	66	81	74	E b S	E b S	E b N	S 89° E	3.8	7.0	0.5	3.72	3.78	...	...
2	.886	.800	.797	.8347	67.0	78.5	68.8	71.80	+ 4.95	.526	.681	.489	.584	80	69	69	74	E b N	S E b E	E b S	S 72 E	1.5	5.2	2.2	3.63	3.79	...	...
3	.787	.723	.763	.7600	72.0	86.1	72.4	76.67	+ 9.82	.657	.710	.701	.675	84	56	88	75	E b S	S b W	Calm.	S 36 W	1.0	10.0	0.0	2.17	3.58	0.085	...
4	.793	.775	.755	.7717	67.7	68.8	63.4	66.75	— 0.05	.557	.569	.457	.521	82	81	78	79	N b W	N b W	Calm.	N 26 W	2.5	1.2	0.0	1.82	1.96	0.130	...
5	.779	.675	.715	.7288	63.0	77.8	68.8	71.13	+ 4.33	.450	.565	.475	.508	78	59	67	67	N b W	S b W	S b W	S 11 E	6.2	3.2	2.0	0.39	2.95	...	...
6	.540	.308	—	—	67.7	73.8	—	—	—	.557	.699	—	—	82	83	—	—	N E b E	S W	W b N	S 50 W	2.3	11.3	6.8	5.44	7.88	0.925	...
7	.364	.417	.535	.4198	62.7	72.0	60.9	65.68	— 1.00	.415	.343	.378	.384	73	43	70	62	W b S	NW b W	Calm.	N 75 W	8.0	19.0	0.0	9.06	9.29	...	...
8	.622	.634	.697	.6592	58.3	72.8	62.3	65.73	— 0.93	.367	.488	.419	.445	75	60	75	70	W b N	S S W	Calm.	S 53 W	1.5	4.5	0.0	1.95	2.19	inap.	...
9	.721	.650	.540	.6260	59.8	77.1	67.4	69.72	+ 3.17	.441	.559	.534	.506	86	59	80	70	W	S b W	S E b E	S 8 E	0.5	3.8	3.8	2.58	3.36	0.165	...
10	.372	.308	.444	.3758	66.3	80.0	67.4	69.97	+ 3.45	.603	.536	.442	.513	93	52	65	71	S S W	W N W	NW b N	N 58 W	9.5	21.5	14.5	12.87	14.91	0.445	...
11	.518	.586	.640	.5923	57.2	61.6	52.2	57.60	— 8.83	.358	.368	.337	.360	76	67	86	76	N N W	N N W	N N E	N 21 W	12.0	10.8	5.2	8.43	8.80	...	..
12	.681	.664	.666	.6700	54.4	66.3	58.3	59.83	— 6.50	.308	.418	.333	.345	73	64	68	66	N b E	S S W	Calm.	N 15 W	6.6	2.0	0.0	0.04	1.59	...	...
13	.751	.712	—	—	49.3	71.3	—	—	—	.282	.402	—	—	80	53	—	—	Calm.	Calm.	Calm.	Calm.	0.0	0.0	0.0	0.00	0.00	...	...
14	.719	.658	.617	.6640	56.9	76.0	63.0	67.22	+ 0.98	.384	.504	.422	.467	83	56	73	70	Calm.	Calm.	S S W	S 24 W	0.0	0.0	2.5	1.57	1.58	...	...
15	.617	.563	.554	.5783	61.6	77.5	71.3	71.27	+ 5.12	.381	.540	.391	.458	69	57	51	60	S S W	S S W	N b W	N 49 W	0.8	2.0	8.0	2.26	4.83	...	.
16	.640	.651	.713	.6730	63.7	72.8	59.8	65.30	— 0.73	.479	.333	.347	.380	81	41	67	62	N N W	N b E	N	N 7 W	7.0	11.0	11.2	9.42	9.63	...	...
17	.779	.799	.752	.7737	54.7	68.8	55.4	61.03	— 4.93	.294	.397	.327	.353	68	56	74	65	N b E	S E b S	Calm.	S 65 E	5.2	6.5	0.0	3.26	3.91	...	...
18	.740	.692	.671	.6988	52.9	71.7	63.0	63.73	— 2.10	.306	.463	.437	.407	76	60	75	69	S E b E	S S E	S E b E	S 50 E	3.0	4.2	0.2	1.45	1.88	...	...
19	.660	.615	.601	.6255	59.8	76.7	62.7	67.47	+ 1.70	.392	.494	.414	.436	76	53	73	65	N N E	S	NW b N	S 45 W	2.5	7.4	1.0	1.82	3.05	...	...
20	.583	.537	—	—	61.6	68.8	—	—	—	.428	.612	—	—	78	87	—	—	W b N	W S W	S W	S 47 W	0.3	8.5	3.4	5.21	5.40	0.220	...
21	.427	.397	.477	.4355	64.1	72.4	59.8	65.07	— 0.37	.538	.415	.369	438	90	52	72	71	S W	N	NW b N	N 18 W	2.9	12.4	8.0	6.76	8.23	0.120	...
22	.550	.512	.535	.5328	52.9	64.5	56.2	58.28	— 7.07	.285	.263	.295	.283	71	43	65	59	N E b N	N N E	NW b N	N 14 W	6.0	3.5	11.0	6.85	7.81	...	...
23	.608	.625	.729	.6632	46.8	60.1	49.0	53.17	—11.97	.264	.233	.235	.254	81	44	67	64	Calm.	N N W	NW b N	N 30 W	0.0	16.0	0.2	7.07	7.17	...	...
24	.785	.786	.791	.7923	48.2	64.8	53.6	56.77	— 8.18	.253	.362	.308	.307	71	59	74	66	NW b N	S b W	W b S	S 81 W	6.0	9.2	2.0	3.45	4.98	...	...
25	.837	.797	.790	.8022	53.6	74.2	61.9	63.68	— 1.05	.319	.403	.413	.378	78	48	75	66	W b N	S S W	Calm.	S 45 W	4.2	6.0	0.0	3.40	3.93	...	...
26	.802	.631	.643	.6862	55.4	77.5	67.4	67.65	+ 3.12	.394	.497	.494	.463	89	52	74	69	Calm.	S W b S	S W b W	S 57 W	0.0	12.0	2.5	5.05	6.79	...	...
27	.707	.715	—	—	58.3	70.2	—	—	—	.412	.266	—	—	84	36	—	—	NW b N	N W b N	N b W	N 26 W	10.0	17.0	3.3	8.87	8.96	...	...
28	.787	.747	.707	.7493	51.5	64.1	54.7	57.90	— 6.23	.304	.323	.325	.319	80	54	76	68	N b W	S E	S S E	S 51 E	1.5	7.4	3.2	3.35	4.08	...	...
29	.737	.755	.786	.7625	49.0	68.1	59.4	60.45	— 3.37	.297	.396	.422	.386	85	57	83	74	S E b S	S E b S	S E	S 40 E	0.5	3.4	0.2	1.86	1.98	...	...
30	.823	.809	.807	.8133	56.9	70.2	64.1	64.77	+ 1.15	.396	.496	.473	.449	85	67	78	74	Calm.	E S E	E b S	S 80 E	0.0	7.0	2.5	3.93	3.98	...	...
31	.809	.702	.680	.7287	60.5	86.1	72.4	73.55	+10.23	.442	.659	.593	.582	84	52	75	71	E b S	S	S W b S	S 5 W	1.5	10.0	2.0	3.85	4.77	...	...
M	29.6957	29.6618	39.6813	29.6799	58.41	72.57	62.32	65.18	— 0.58	.399	.465	.421	.434	79	57	73	69	....	....	....	....	3.45	7.85	3.10	......	5.07	1.990	......

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR AUGUST, 1865.

NOTE.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely, at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer . . . . . . 29.959 at 8 a.m. on 1st. } Monthly range=
Lowest Barometer . . . . 29.308 at 2 p.m. on 6th & 10th. } 0.651 inches.

Self-registering Ther.
Maximum temperature . . . 87°.8 on 3rd & 31st. } Monthly range=
Minimum temperature . . . 41°.4 on 24th. } 43°4
Mean maximum temperature . . 74°95 } Mean daily range=19°54
Mean minimum temperature . . 55°42 }
Greatest daily range . . . . 30°8 from a.m. to p.m. of 31st.
Least daily range . . . . 7°0 from a.m. to p.m. of 11th.

Warmest day . . . . 3rd...Mean Temperature . . . 76°67 } Difference=23°.50
Coldest day . . . . . 23rd...Mean Temperature . . . 53°17 }

Maximum Radiation { Solar . . . . 132°5 on 3rd } Monthly range=
Maximum Radiation { Terrestrial . . . . 34°0 on 24th } 98°.5

Aurora observed on 8 nights, viz.:—on 2nd, 4th, 12th, 14th, 16th, 18th, 22nd and 25th.
Possible to see Aurora on 22 nights; impossible on 9 nights.
Raining on 8 days; depth 1 990 inches; duration of fall, 20.4 hours.
Mean of cloudiness=0.38; Most cloudy hour observed, 2 p.m; mean=0.44; least cloudy hour observed, 6 a.m.; mean=0.30.

Sums of the components of the Atmospheric Current, expressed in Miles.

North.	South.	East.	West.
1606.51	1024.28	612.74	1605.20

Resultant direction, N. 60° W.; Resultant Velocity, 1.55 miles per hour.
Mean velocity 5.07 miles per hour.
Maximum velocity 26.3 miles, from 3 to 4 p.m. on 10th.
Most windy day 10th—Mean velocity 14.91 miles per hour. } Difference 14.91.
Least windy day 13th—Mean velocity 0.00 miles per hour. }
Most windy hour, 1 p.m.—Mean velocity, 8.35 miles per hour. } Difference
Least windy hour, 8 p.m.—Mean velocity, 3.06 miles per hour. } 5.29 miles.

2nd. Splendid aurora during night. 3rd. Lightning during evening.
4th. Splendid auroral display, accompanied by a great magnetic disturbance.
8th. Distant thunder.
12th. Auroral light and streamers; a number of shooting stars observed.
15th. Lightning during evening. 20th. Distant thunder.
22nd. Solar halo. 30th. Solar halo during morning. 31st. Lunar halo.
Dew recorded on ten occasions during month.

The month of August was cool, dry, and clear. The velocity of the wind differed little from the average.

COMPARATIVE TABLE FOR AUGUST.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above Average	Maximum observed.	Minimum observed.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant.		Mean Force or Velocity
										Direction.	Velocity.	
1840	64.7°	— 1.5	80.1°	47.4°	32.7°	12	2.905	...	...	...	...	...
1841	64.4	— 1.8	83.5	46.7	36.8	9	6.170	...	...	...	...	0.19 lbs
1842	65.7	— 0.5	80.7	45.3	35.4	6	2.500	...	...	...	...	0.30 "
1843	66.4	+ 0.2	85.5	44.4	41.1	4	4.850	...	...	...	...	0.12 "
1844	64.3	— 1.9	82.5	44.3	38.2	17	imper	...	...	...	...	0.16 "
1845	67.9	+ 1.7	82.5	44.4	38.1	9	1.725	...	...	...	...	0.19 "
1846	68.4	+ 2.2	86.3	50.4	35.9	9	1.770	...	...	...	...	0.17 "
1847	65.1	— 1.1	83.1	44.9	38.2	10	2.140	...	...	...	...	0.19 "
1848	69.2	+ 3.0	87.5	49.3	38.2	8	0.855	...	...	S 21 E	0.98	4.55 ms
1849	66.3	+ 0.1	79.5	51.4	28.1	10	4.970	...	...	N 71 W	0.60	3.76 "
1850	66.8	+ 0.6	84.2	43.0	41.2	13	4.355	...	...	N 15 E	0.35	4.46 "
1851	63.6	— 2.6	79.8	43.6	36.2	10	1.360	...	...	N 63 W	0.40	4.63 "
1852	65.9	— 0.3	81.2	46.7	34.5	9	2.695	...	...	N 70 E	0.56	3.30 "
1853	68.6	+ 2.4	91.6	47.6	44.0	11	2.575	...	...	S 36 E	0.30	4.26 "
1854	68.0	+ 1.8	98.1	47.0	51.1	5	0.455	...	...	N 64 W	1.76	4.60 "
1855	64.1	— 2.1	82.1	44.9	37.2	7	1.455	...	...	N 63 W	1.04	6.97 "
1856	63.6	— 2.6	81.3	44.0	37.3	12	1.680	...	...	N 50 W	2.88	7.03 "
1857	65.3	— 0.9	85.3	50.1	35.2	13	5.265	...	...	N 77 W	1.51	6.36 "
1858	67.6	+ 1.4	83.4	45.4	38.0	11	3.890	...	...	N 69 W	1.57	6.50 "
1859	66.6	+ 0.4	81.4	46.2	35.2	11	3.900	...	...	N 36 W	1.62	5.96 "
1860	64.5	— 1.7	81.8	47.1	34.7	14	3.405	...	...	N 70 W	1.83	5.80 "
1861	65.5	— 0.7	82.5	48.2	34.3	15	2.953	...	...	N 8 E	0.46	4.21 "
1862	67.6	+ 1.4	87.6	47.7	39.9	15	3.483	...	...	N 78 W	1.67	5.96 "
1863	66.6	+ 0.4	87.2	43.9	43.3	12	2.208	...	...	S 61 W	1.80	4.89 "
1864	68.6	+ 2.4	92.6	48.6	44.0	16	5.060	...	...	N 70 W	1.38	4.75 "
1865	65.2	— 1.2	86.1	46.8	39.3	8	1.990	...	...	N 60 W	1.55	5.07 "
Results to 1864.	66.21	...	84.45	46.50	37.95	10.7	3.026	...	...	N 67 W	0.93	5.18
Exc. for 1865.	—1.03	...	+1.65	+0.30	+1.35	—2.7	—1.036	...	...	...	...	—0.11

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST,—SEPTEMBER, 1865.

Latitude—43 deg. 39.4 min. North. Longitude—5 h. 17 min. 33 sec. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32°.				Temp. of the Air.				Excess of mean above Normal.	Tens. of Vapour.				Humidity of Air.				Direction of Wind.			Resultant Direction.	Velocity of Wind.					Rain in Inches.	Snow in Inches.
	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M	2 P.M.	10 PM	ME'N		6 A.M	2 P.M.	10 P.M.	M'N	6 A.M	2 P.M.	10 P.M.	M'N	6 A.M.	2 P.M.	10 P.M.		6 A.M	2 P.M	10 PM	Re-sul't.	ME'N		
1	29.700	29.658	29.627	29.6557	71.3°	77.8°	63.0°	70.35°	+7.32°	.651	.659	.462	.578	86	69	80	78	SW b W	SW b W	S S W	S 62° W	3.8	5.0	0.8	1.66	3.01	Inp	...
2	.605	.558	.555	.5712	61.6	77.4	65.6	69.20	+6.47	.331	.571	.492	.494	69	61	78	69	N W b W	E b N	E	N 84 E	1.6	5.6	4.0	3.48	3.76	...	...
3	.566	.550	—	—	65.2	80.3	—	—	—	.497	.674	—	—	80	65	—	—	Calm.	S E	S E	S 51 E	0.0	6.6	2.0	3.29	3.37	...	...
4	.629	.575	.558	.5802	67.0	85.4	73.1	75.65	+13.52	.566	.771	.583	.641	86	64	72	73	Calm.	S S W	S W b S	S 23 W	0.0	12.8	2.0	4.86	4.93	...	...
5	.535	.539	.568	.5417	70.2	83.2	68.8	74.38	+12.55	.666	.421	.411	.509	90	36	58	62	Calm.	W b S	Calm.	N 40 W	0.0	5.8	0.0	2.11	3.79	0.030	...
6	.549	.511	.528	.5268	61.6	74.9	63.4	67.42	+5.98	.468	.476	.417	.444	85	55	71	67	N b W	S	S W b W	S 35 W	0.2	7.4	1.6	4.38	5.05	...	...
7	.565	.543	.582	.5672	58.7	79.6	69.9	70.78	+9.63	.384	.605	.527	.518	78	60	72	69	W S W	S b W	Calm.	S 65 E	2.2	8.0	0.0	3.60	6.24	...	...
8	.601	.477	.503	.5178	60.1	60.1	64.1	61.43	+0.70	.439	.476	.565	.490	84	92	94	89	E b N	E b N	E N E	N 71 E	16.0	19.2	4.0	10.66	10.80	0.500	...
9	.557	.583	.661	.6067	64.5	69.9	62.3	65.68	+5.53	.586	.642	.510	.582	96	88	90	91	E N E	E N E	Calm.	N 13 E	8.0	1.0	0.0	0.97	3.25	Inp.	...
10	.708	.624	—	—	61.6	76.0	—	—	—	.493	.588	—	—	90	65	—	—	W b N	S W	Calm.	S 22 E	3.0	2.0	0.0	0.90	2.10	Inp.	...
11	.491	.555	.615	.5598	69.5	77.1	63.7	69.87	+10.22	.661	.685	.400	.560	92	73	68	76	S W b S	S b W	Calm.	S 87 W	1.5	7.2	0.0	2.07	3.17	0.045	...
12	.725	.769	.773	.7600	55.1	76.4	67.0	67.43	+8.20	.331	.348	.486	.405	76	37	73	61	W N W	E S E	E b N	S 81 E	1.0	3.5	1.5	2.73	3.44	...	...
13	.815	.811	.808	.8125	65.9	77.1	70.6	71.15	+12.30	.567	.529	.532	.534	89	57	71	71	E b N	E S E	E b N	S 82 E	3.2	3.0	4.2	2.24	2.29	...	...
14	.743	.654	.706	.7003	65.6	87.2	73.5	75.12	+16.78	.599	.711	.637	.665	95	55	78	78	Calm.	W N W	Calm.	N 82 W	0.0	11.8	0.0	3.59	5.23	0.005	...
15	.817	.853	.900	.8652	61.9	72.4	66.6	67.33	+9.42	.451	.311	.352	.344	82	39	54	54	Calm.	S S W	N b W	N 32 W	0.0	8.8	2.0	2.29	4.11	...	...
16	.958	.841	.697	.8228	51.8	72.4	64.1	64.70	+7.18	.290	.440	.486	.411	75	55	81	67	Calm.	S E b S	Calm.	S 23 E	0.0	0.5	0.0	0.36	0.46	...	...
17	.614	.583	—	—	67.7	69.5	—	—	—	.585	.632	—	—	87	88	—	—	S W	Calm.	N E b E	N 29 E	1.0	0.0	10.6	5.37	6.96	0.940	...
18	.745	.779	.844	.7940	45.7	59.4	50.8	52.27	—4.35	.239	.221	.212	.222	78	43	56	57	N E b N	N E	Calm.	N 40 E	7.5	10.0	0.0	4.90	4.95	...	...
19	.921	.877	.845	.8775	43.2	62.7	54.4	54.50	—1.62	.235	.274	.362	.296	83	48	86	71	N N E	S S W	S W	S 25 W	2.8	5.2	2.5	3.15	3.94	...	...
20	.853	.774	.736	.7798	50.4	68.4	58.3	59.83	+4.23	.330	.533	.401	.417	90	77	83	81	S W	S b W	S W b W	S 24 W	1.0	6.0	1.6	3.65	3.76	...	...
21	.765	.762	.778	.7655	54.4	65.5	60.1	61.15	+6.03	.385	.506	.461	.451	91	80	89	84	S W	S W	Calm.	S 56 W	0.4	6.5	0.0	1.13	1.32	Inp.	...
22	.815	.831	.869	.8387	59.8	69.9	63.4	65.08	+10.45	.428	.584	.521	.523	83	79	89	84	Calm.	S b E	S b E	S 33 E	0.0	5.0	0.5	1.69	2.15	...	...
23	.895	.852	.806	.8435	63.0	68.8	62.3	64.23	+10.02	.539	.569	.522	.529	93	81	93	88	E	E b S	E S E	S 84 E	2.8	6.0	0.6	2.31	2.35	...	...
24	.747	.655	—	—	58.3	66.3	—	—	—	.476	.618	—	—	98	95	—	—	Calm.	S W b S	S W	S 45 W	0.0	4.0	6.1	3.42	3.94	0.885	...
25	.609	.648	.765	.6838	57.3	71.0	55.1	61.48	+8.25	.403	.527	.343	.400	86	69	78	73	W N W	N W b N	N N W	N 32 W	1.6	13.6	5.0	8.18	8.53	...	...
26	.873	.907	.933	.9123	44.6	56.9	49.7	50.72	—2.20	.264	.296	.317	.286	90	64	89	78	N	S E b S	S b E	S 57 E	7.0	5.2	2.0	2.53	3.92	...	...
27	30.012	.990	.966	.9865	46.1	62.3	52.6	54.57	+2.35	.282	.348	.364	.338	90	62	92	81	S E b E	E b S	E	S 82 E	3.2	7.6	4.0	4.43	4.51	...	...
28	29.988	.915	.845	.9118	49.3	68.1	58.0	58.88	+7.05	.323	.471	.428	.414	91	68	89	83	E	E	E	N 87 E	1.2	2.8	3.8	1.94	1.93	...	...
29	.797	.681	.585	.6803	53.3	73.1	64.8	64.10	+12.78	.399	.555	.528	.496	98	68	87	84	E	S b E	S S W	S 13 W	3.0	7.6	4.0	3.24	4.43	0.045	...
30	.546	.510	.450	.5072	59.0	62.3	55.8	59.47	+8.65	.451	.359	.290	.352	90	64	65	69	Calm.	W S W	S W b W	S 74 W	0.0	8.0	6.6	5.61	5.87	Inp.	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	....	....	....	....	...	...	...	...	...	...	...
M	29.7350	29.7097	29.7116	29.7180	58.11	71.51	62.35	64.49	+7.00	.435	.496	.446	.458	86	63	78	75	....	....	....	....	2.40	6.52	2.31	......	4.12	2.450	......

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR SEPTEMBER, 1865.

NOTE.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer..........................30.021 at 8 a.m. on 27th } Monthly range =
Lowest Barometer ....29.443 at 2 p.m. on 8th } 0.578 inches.

Self-registering Thermom.
Maximum Temperature.............................90°5 on 14th } Monthly range =
Minimum Temperature.............................42°0 on 19th } 48°5
Mean maximum Temperature.............................74°07 } Mean daily range=
Mean minimum Temperature.............................57°10 } 16°97
Greatest daily range......24°9 from a.m. to p.m. of 14th.
Least daily range .... 6°5 from a.m. to p.m. of 30th.

Warmest day......... 4th...Mean temperature................75°65 } Difference = 24°93
Coldest day......... ..26th...Mean temperature................50°72 }
Maximum Radiation. } Solar.................................126°5 on 5th and 14th } Monthly range =
Terrestrial.. 35°0 on 19th } 91°5
Aurora observed on 7 nights, viz:—11th, 12th, 15th, 16th, 18th, 20th, and 26th.
Possible to see Aurora on 23 nights; Impossible on 7 nights.
Raining on 12 days, depth 2.450 inches; duration of fall 39.2 hours.
Mean of cloudiness = 0.39.
Most cloudy hour observed, 8 a.m.; mean = 0.54; least cloudy hour observed, 4 and 10 p.m.; mean, = 0.30.

Sums of the components of the Atmospheric Current, expressed in miles.

North.	South.	East.	West.
790.22	978.45	1136.83	854.03

Resultant direction S. 56° E.; Resultant velocity 0.47 miles per hour.
Mean velocity..............................4.12 miles per hour.
Maximum velocity.........................20.0 miles, from 4 to 5 a.m. of 15th.
Most windy day......... 8th............Mean velocity, 10.80 miles per hour. } Difference=
Least windy day.........16th............Mean velocity, 0.46 ditto } 10.34 miles.
Most windy hour ......11 a.m.........Mean velocity, 6.88 ditto } Difference=
Least windy hour......10 p.m.........Mean velocity, 2.17 ditto } 4.71 miles.
1st. Solar halo. 3rd. Sheet lightning at night.
4th. Dense fog during morning. 6th. Lunar halo. 7th. Lunar halo.
12th. Hoar frost at 5 a.m. 13th. Sheet lightning at night.
14th. Ground fog at 6 a.m.; very sultry day; sheet lightning at night.
17th. Thunder-storm, 10 a.m. to 1 p.m.; dense fog at night.
19th. Hoar frost, 6 a.m. 20th. Fine solar halo.
23rd. Considerable number of shooting stars observed.
24th. Thunder-storm during forenoon. 29th. Dense fog, 6 a.m.; lightning at 4 p.m.

September, 1865, was warm, dry, calm, and clear. The mean temperature was the highest recorded, the only previous September approaching to it being 1846.

COMPARATIVE TABLE FOR SEPTEMBER.

YEAR.	TEMPERATURE.					RAIN.		SNOW.		WIND.		
	Mean.	Excess above aver'ge	Max. ob-served.	Min. ob-served.	Range.	No. of days.	Inches	No. of days.	Inches	Resultant. Direction.	Resultant. V'y.	Mean Force or Velocity.
	°	°	°	°	°							
1840	54.0	— 3.8	70.2	29.4	40.8	4	1.380	...	...	...	...	....
1841	61.3	+ 3.5	79.9	37.5	42.4	9	3.340	...	...	...	...	0.26 lbs.
1842	55.7	— 2.1	83.5	28.3	55.2	12	6.160	...	...	...	...	0.45
1843	59.1	+ 1.3	87.8	33.1	54.7	10	9.760	...	...	...	...	0.57
1844	58.6	+ 0.8	81.5	29.6	51.9	4	Imp.	...	...	...	...	0.26
1845	56.0	— 1.8	78.8	35.3	43.5	16	6.245	...	...	...	...	0.34
1846	63.6	+ 5.8	84.0	39.0	45.0	11	4.595	...	...	...	...	0.33
1847	55.6	— 2.2	74.8	38.1	36.7	15	6.665	...	...	...	...	0.33
1848	54.2	— 3.6	80.9	29.5	51.4	11	3.115	...	...	N 71° W	2.38	5.81mls.
1849	58.2	+ 0.4	80.6	33.5	47.1	9	1.480	...	...	N 75° W	0.69	4.23
1850	56.5	— 1.3	76.0	31.7	44.3	11	1.735	...	...	S 65° W	1.02	4.78
1851	60.0	+ 2.2	86.3	33.4	52.9	9	2.665	...	...	N 14° E	1.03	5.45
1852	57.5	— 0.3	81.8	36.1	45.7	10	3.630	...	...	N 77° W	0.53	4.60
1853	58.8	+ 1.0	85.4	36.1	49.3	12	5.140	...	...	N	1.06	4.33
1854	61.0	+ 3.2	93.1	36.3	56.8	14	5.375	...	...	N 22° W	1.33	4.04
1855	59.5	+ 1.7	81.7	36.1	45.6	12	5.585	...	...	N 20° E	1.29	7.61
1856	57.1	— 0.7	77.3	37.4	39.9	13	4.105	...	...	S 79° W	1.98	6.53
1857	58.6	+ 0.8	81.4	34.1	47.3	11	2.640	...	...	N 68° W	1.61	5.55
1858	59.1	+ 1.3	80.1	36.8	43.3	8	0.735	...	...	S 74° W	1.53	5.69
1859	55.2	— 2.6	73.8	35.7	38.1	15	3.525	...	...	N 44° W	1.60	6.36
1860	55.3	— 2.5	74.2	28.7	45.5	14	1.959	...	...	N 71° W	2.63	5.79
1861	59.1	+ 1.3	78.2	37.1	41.1	17	3.607	...	...	N 71° W	1.39	4.81
1862	59.6	+ 1.8	78.9	41.0	37.9	9	2.344	...	...	N 59° W	1.07	5.11
1863	55.9	— 1.9	78.2	31.6	46.6	8	1.235	...	...	N 16° W	0.92	6.46
1864	56.4	— 1.4	72.4	41.0	31.4	11	2.508	...	...	N 38° W	1.89	7.06
1865	64.5	+ 6.7	87.2	43.2	44.0	12	2.450	...	...	S 56° E	0.47	4.12
Results to 1864.	57.84	....	80.03	34.66	45.38	11.0	3.730	...	...	N 57° W	1.15	5.54
Excess for 1865.	+ 6.65	...	+ 6.17	+8.54	— 1.38	+ 1.0	— 1.280	...	...	....	..	— 1.42

INDEX.

PAGE.

- A Monograph of the British Spongiadae, by I. S. Bowerbank, LL.D., &c., review of ... 355
- Abyssinia, New Empire of ... 46, 138, 204
- Address of the President 21st January, 1865 ... 81
- Africa, The Palms of ... 285
- Barrett, Dr. M. Composition, structure and development of Bone ... 194
- Bethune, Rev. C.I.S. (M.A.). Nocturnal Lepidoptera in Canada ... 247
- Boole, The late Professor ... 44

CANADIAN INSTITUTE, PROCEEDINGS OF:

- Annual Report for the year 1864 ... 287
  - “ “ of the Treasurer ... 295
  - “ “ of the Medical Section ... 296
  - “ “ of the Entomological Committee ... 297
  - “ “ of the Librarian ... 298
- Second Ordinary meeting, 10th December, 1864 ... 364
- Annual General Meeting, 17th “ “ ... 364
- Third Ordinary Meeting, 21st January, 1865 ... 365
- Fourth “ 28th “ “ ... 366
- Fifth “ 4th February, “ ... 366
- Sixth “ 11th “ “ ... 366
- Eighth “ 4th March, “ ... 430
- Ninth “ 11th “ “ ... 430
- Tenth “ 18th “ “ ... 430
- Eleventh “ 1st April “ ... 431
- Extra Meeting, 21st “ “ ... 431

Carpenter, Mary, Our Convicts, review of ... 412

CHAPMAN, PROF. E. J., PH. D., CONTRIBUTIONS TO BLOWPIPE ANALYSIS ... 339

- Action of Baryta on Titanic Acid ... 343
- Detection of Lithia in the presence of Soda ... 340
- Detection of Alkalies in the presence of Magnesia ... 342
- Detection of Baryta in the presence of Strontia ... 343
- Detection of Oxide of Manganese when present in minute quantities in mineral bodies ... 344
- Detection of minute traces of Copper in Iron Pyrites and other bodies 346
- Detection of Lead in the presence of Bismuth ... 347
- Detection of Antimony in Tube Sublimates ... 348
- Method of distinguishing the red flame of Lithia from that of Strontia, 341
- Method of distinguishing the monoxide of Iron (Fe_o) from the sesquioxide (Fe_2O_3) in Silicates and other compounds ... 345

PAGE.
Reaction of Manganese Salts on Baryta........................... 342
The Coal Assay.. 349
On some minerals from Lake Superior.......................... 406
Chemical Notes by Professor Croft, D.C.L........................ 333
On the Iodide of Barium...................................... 333
On the Oxidation of Alkaline arsenites.......................... 334
Chorisis as an explanation of certain vegetable structures. on, by Rev. Prof. Hincks, F.L.S., &c...................................... 372
Contributions to Blowpipe Analysis by E. J. Chapman, Ph. D............. 339
Cuming, Hugh, The Death of..................................... 363
D. W. *Review:*
The Smithsonian Institution, its Founder, Building, operations, &c........ 119
E. I. C. *Review:*
Canadian Canals, by W. Kingsford, Esq., C.E........................ 261
Entomological Society of Canada................................. 216
Errata Recepta, written and spoken, by the Rev. H. Scadding, D.D. 31, 224, 386
Hamilton, Sir W. Rowan, Death of................................. 364
Hincks, Rev. Prof. W., (F.L.S., &c.,) on the Principles of Classification in the Animal Kingdom...................................... 19
Hincks, Rev. Prof. W., (F.L.S., &c.) Thoughts on belief and evidence...... 232
On chorisis as an explanation of certain vegetable structures......... 372
Hooker, Sir W. Jackson, Death of................................. 364
Kingston, Prof. G. T. (M.A.), Magnetic Elements at Toronto 1856, 1864 inclusive.. 114
Langton, John, (M.A.) On the census of Canada 1861..................... 1
Lindley, Dr., Obituary Notice..................................... 428
Magnetic Elements at Toronto, C. W., 1856-64 inclusive, by Prof. G. T. Kingston, M.A.. 114
Minerals from Lake Superior, On some, by Prof. E. J. Chapman, Ph. D,.... 406
Mowat, Hon. O. Annual Address as President of the Canadian Institute.... 81
McCaul, Rev. I. (LL.D.) On Latin Inscriptions found in Britain........95, 303
Nocturnal Lepidoptera in Canada, by Rev. C. I. S. Bethune, (M.A.)........ 247
Notes on Latin Inscriptions found in Britain, by the Rev. I. McCaul, (L.L.D.)..95, 303
Notes on Trilinears, by J. B. C.................................... 334
Obituary of Scientific men......................................363, 428
On the Composition, Construction, and Development of Bone, by M. Barrett, M.A., M.D.. 194
On the Iodide of Barium, by Prof. Croft, D.C.L........................ 333
On the oxidation of Alkaline Arsenitics, by Prof. Croft, D.C.L............ 334
Oronhyatekha, on the Mohawk Language.............................. 182
Peru, Indian, Graves of.. 284
Reeve, Mr. Lovell, Death of....................................... 429
Remarkable Photograph Experiments................................. 136
Remarks on Prof. Boole's Mathematical Theory of the Laws of Thought, by G. P. Young, M.A... 161

PAGE.

Remarks on the Principles of Classification in the animal kingdom, in reference to a recent paper by I. W. Dawson, LL.D., F.R.S., by the Rev. W. Hincks, F.L.S., &c 19

REVIEWS:

Lectures on the Elements of Comparative anatomy, by T. H. Huxley, F. R. S., on the classification of animals, and on the Vertebrata Skull, by W. H. 40

Observations on the Terrestrial Pulmonifera of Maine, including a Catalogue of all the species of land and fluviatile Mollusca, known to inhabit the State, by Ed. S. Morse 42

Smithsonian Institution, its founder, building, operations, &c., &c. 119

Canadian Canals, by W. Kingsford, Esq., C. E. 261

Our Convicts, by Mary Carpenter, 2 vols. 412

Scadding, Rev. H., D.D. on Errata Recepta, written and spoken...31, 223, 386

The Census of Canada, 1861, by John Langton, Esq., M A 1

The late Prof. Boole 44

Theodore II. and the New Empire of Abyssinia, translated from *Revue des deux Mondes* 46, 138, 204

The President's Address 1864 81

The Hairy Men of Yesso 134

The Mohawk Language, by Oronhyatekha 182

Thoughts on Belief and Evidence, by the Rev. Prof. W. Hincks, F.L.S., &c., 232

The Indian Graves of Peru 284

The Palms of Western Tropical Africa 285

W. H. *Reviews :*

Lectures on the elements of comparative anatomy, by T. H. Huxley, F.R.S., &c 40

Observations on the Terrestrial Pulmonifera of Maine, by Ed. S. Morse.. 42

A Monograph of the British Spongiadae, by Dr. Bowerbank 355

Our Convicts, by Mary Carpenter 912

Young, Rev. G. P., on the Laws of Thought 161

METEOROLOGICAL TABLES.

Month October, 1864, and comparative Table 77, 78

" November " " 79, 80

Mean results at Toronto for year 1864 108

Meteorological Tables, December, 1864, and comparative Table 157, 158

" January, 1865 " 159, 160

" February, " " 219, 220

" March, " " 221, 222

" April, " " 299, 300

" May, " " 301, 302

" June, " " 367, 368

" July, " " 369, 370

" August " " 432, 433

" September " " 434, 435

BRITISH REVIEWS.

L. SCOTT & CO., NEW YORK.

I. THE LONDON QUARTERLY [Conservative.]
II. THE EDINBURGH REVIEW [Whig.]
III. THE NORTH BRITISH REVIEW [Free Church.]
IV. THE WESTMINSTER REVIEW [Liberal.]
V. BLACKWOOD'S EDINBURGH MAGAZINE [Tory.]

EARLY COPIES.

The receipt of Advance Sheets from the British publishers gives additional value to these Reprints, inasmuch as they can now be placed in the hands of subscribers about as soon as the original editions.

TERMS:

	Per ann.
For any one of the four Reviews	$3.00
For any two of the four Reviews	5.00
For any three of the four Reviews	7.00
For all four of the Reviews	8.00
For Blackwood's Magazine	3.00
For Blackwood and three Reviews	9.00
For Blackwood and the four Reviews	10 00

Payments to be made in all cases in advance.

CLUBBING.

A discount of twenty-five per cent. from the above price will be allowed to Clubs ordering four or more copies of any one or more of the above works.

POSTAGE.

In all principal Cities and Towns, these works will be delivered, Free of Postage. Mail Subscribers in Canada will receive the works Free of U. S. Postage.

N.B.—The price in Great Britain of the five Periodicals above-named is $31 per annum.

CONTENTS.

PAGE

I. On Chorisis—As an explanation of certain Vegetable Structures. By the Rev. William Hincks, F.L.S., F.B.S. Edin. 371

II. On Errata Recepta, Written and Spoken. By the Rev. Dr. Scadding. 386

III. On some Minerals from Lake Superior. By E. J. Chapman, Ph.D. 406

Reviews:

Our Convicts. By Mary Carpenter 412

Miscellaneous:

Obituary Notice 428

Canadian Institute:

The Ordinary Meetings 430

Meteorology:

August Meteorological Table for Toronto 432
Remarks on " " 433
September Meteorological Table for Toronto 434
Remarks on " " 435

***** The Annual Subscription, due in January, Country Members, $3; in Toronto, $4.**

The next Number of this Journal will be issued in January.

SMITHSONIAN INSTITUTION LIBRARIES
3 9088 00897 5716